

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

UNITED STATES OF AMERICA,)
v.)
Plaintiff,) Civil No. 99-CV-02496 (GK)
PHILIP MORRIS USA, INC.,) Next Scheduled Court Date:
f/k/a PHILIP MORRIS INC., et al.,) Trial Ongoing
Defendants.)

)

DEFENDANTS' WRITTEN DIRECT EXAMINATION OF
W. KIP VISCUSI

SUBMITTED PURSUANT TO ORDER #471

Written Direct: W. Kip Viscusi, US v. PM, et al., 99-cv-02496 (D.D.C.) (GK)

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I. QUALIFICATIONS & BACKGROUND

2 Q: Please state your name for the record.

3 A: W. Kip Viscusi.

4 Q: Is JD-025173 a copy of your current curriculum vitae?

5 A: Yes. It is.

6 Q: What is your occupation, Dr. Viscusi?

7 A: I am an economist, and I teach at Harvard Law School where I am a Professor.

8 Q: Could you briefly describe the subject of your testimony?

9 A: In general terms, I will testify about consumers' perceptions regarding the health risks of
10 smoking and the impact of those perceptions on consumer smoking behavior. My testimony will
11 focus on the following areas and opinions. First, smoking risks are without question the most
12 highly publicized and well-known risks we face for a widely used product. For decades, the
13 risks of smoking have been made known to members of the public, through virtually every
14 conceivable channel of communication, including unprecedented governmental and public health
15 community efforts and media coverage of the risks. For at least the past 20 years these risks
16 have been so widely understood and acknowledged that the public, including both adolescents
17 and adults, believes that the hazards of smoking are greater than scientists have estimated.

¹⁸ Similarly, there is nearly universal understanding that smoking can be quite hard to quit.

19 Younger persons tend to have even higher estimates of the risks and difficulty of quitting than
20 adults.

21 Second, I review how people make decisions under uncertainty, and I apply these
22 principles to cigarette smoking behavior. The empirical data demonstrate that people have
23 robust awareness of the risks, and when they make the risky decision to smoke, they understand

1 and act upon those beliefs about the risks and the anticipated costs of their smoking behavior.
2 Again, younger persons incorporate their awareness of the risks and cost assessments in the
3 decision making process in a manner similar to adults. Smoking rates among youth are as
4 sensitive to risk perceptions and price as among adults. In addition, I will respond to Dr.
5 Weinstein's and Dr. Slovic's testimony on these subjects, and to their criticism of my research.

6 Q: On what do you base your opinions?

7 A: I am an economist. Most of my research career has focused on analysis of empirical data,
8 which I also draw on in my analysis of smoking. I also draw on my research and training in the
9 field of economics generally, risk analysis, and my research and writing in the area of smoking
10 risks.

11 A. Education

12 Q: Would you please describe your educational background?

13 A: I graduated from high school in Kentucky, and then went to Harvard University where I
14 received a Bachelor's degree in Economics; a Master's degree in Public Policy; a Master's
15 degree in Economics; and a Ph.D. in Economics.

16 Q: All four of your degrees are from Harvard?

17 A: That's right.

18 Q: Did you receive any honors or awards for your academic work at Harvard?

19 A: Yes. I was *Phi Beta Kappa*, graduated *summa cum laude*, won the prize for the best
20 undergraduate thesis in economics and, as a doctoral student, won the award for the best Ph.D.
21 dissertation in economics.

22 Q: Does your educational background include training in statistics and statistical
23 methods?

1 A: Yes; statistics is a cornerstone of my work. I was an applied math and economics major
2 and have been using statistical methods to evaluate empirical data ever since I was an
3 undergraduate. Currently, I am the founding director of the program on empirical legal studies at
4 Harvard, which involves the use of statistics to analyze legal issues.

5 Q: What was the subject of your doctoral dissertation?

6 A: My dissertation was called "Employment Hazards: An Investigation of Market
7 Performance." It was in the field of risk analysis, specifically on employment risks, how
8 workers learn about the risks, how workers ultimately assess the risks, and the various market
9 mechanisms that address these risks.

10 Q: Why did you choose that subject?

11 A: I became interested in that area of economic study for two main reasons. I worked on the
12 assembly line at General Electric for two summers and began to get a practical appreciation in
13 that environment for why the safety of workers was a major economic concern. I became quite
14 interested in the relationship between risk and jobs. I also spent two summers working for Ralph
15 Nader, who had done a lot of work on auto safety and other safety issues, and that also
16 stimulated my interest in how and why risk and risk perception were a major economic concern.

17 Q: Do you specialize within the field of economics?

18 A: Yes. My main specialty is the study of risk and uncertainty, particularly as those areas
19 relate to health and safety issues. My particular areas of specialization include risk perception,
20 hazard warnings, market responses to risk, government regulation of risk, and the role of other
21 social institutions regarding risk. In short, my main research interest is on individual and societal
22 responses to risk and uncertainty.

23 Q: When you say your main specialty is risk and uncertainty, could you be a little more

1 specific?

2 A: It means that I focus on how people make decisions involving precisely understood risks
3 as well as less well understood hazards, which are called situations of uncertainty. For example,
4 in the financial market, one might study people's decisions and behavior given the chance that
5 the price of a particular stock will go up or down. The risks of primary interest to me are those
6 posing potentially adverse health outcomes rather than financial losses. In the area of health and
7 safety, one might study people's decisions and behavior given the chance that an individual will
8 be injured or killed on the job, or the chance that an individual will be injured by a particular
9 product.

10 Q: You've also mentioned "risk perception" and "risk analysis." Would you define
11 those terms for us?

12 A: Sure. "Risk perception" describes what people believe the risks are. Thus, the concern is
13 with people's subjective risk beliefs. In contrast, "risk analysis" refers to the broader intellectual
14 discipline that includes studies of an objective measure of the risk. The typical risk analysis
15 involves a scientific calculation of what the actual risks are and what the value of these risks are
16 to society. One aspect of the risk analysis field also involves a comparison of the subjective risk
17 perceptions with objective risk measures to determine the accuracy of those perceptions.

18 Q: How do the subjects of risk perception and risk analysis fit within the general field
19 of economics?

20 A: Risk analysis is an important part of economics. A basic tenet of economics is that
21 consumers trade off risks and costs for the value or benefits that they perceive. This economic
22 model of consumer behavior is supported by an enormous literature analyzing empirical data.
23 Thus, consumer behavior is driven by cost/benefit assessments and decisions. For example,

1 workers' perceptions of job risks influence the wages they will demand to accept various types
2 of employment. Accordingly, economists have long studied risks and risk assessments – e.g.,
3 risk in the stock market, the risk that individuals will be injured on the job or by products –
4 because these risks and the way people perceive these risks have important effects on the
5 economy. In fact, risk and uncertainty have become an integral part of economics, and economic
6 journals such as the JOURNAL OF RISK AND UNCERTAINTY, the JOURNAL OF RISK RESEARCH, and
7 RISK ANALYSIS are specifically devoted to those topics.

8 Q: How long you have worked in the field of risk analysis?

9 A: Risk analysis has been the focus of my work throughout my professional career. I have
10 been doing this since 1976, when I wrote my doctoral dissertation in the area.

11 B. Employment

12 Q: You mentioned that you are a professor at Harvard Law School. What is your title?

13 A: I am the John F. Cogan, Jr. Professor of Law and Economics at Harvard.

14 Q: What is an economist doing teaching at Harvard Law School?

15 A: I teach economics and statistics in areas such as government regulation, risk and
16 regulation, antitrust, the treatment of scientific evidence, and public policy.

17 Q: What classes do you teach at Harvard?

18 A: I teach economics and regulation in antitrust; risk and environmental regulation;
19 statistical analysis of scientific evidence, and behavioral law and economics.

20 Q: Are smoking risks part of the curriculum in any of the classes you teach?

21 A: Yes. Smoking regulation has been a long term, major area of government interest. I
22 discuss smoking risks in my classes on regulation and on the evaluation of scientific evidence,
23 and often use it as an example when I discuss statistics. I have found it to be a particularly useful

1 topic in leading classroom discussions and in illustrating statistical, economic, and scientific
2 principles.

3 Q: Before you joined the faculty at Harvard, did you teach economics and risk analysis
4 at other universities?

5 A: Yes, I have also taught risk analysis at Northwestern University, Duke University, and
6 the University of Chicago.

7 Q: Have you taught risk analysis outside of the traditional college or university setting?

8 A: Yes. Over the years I have taught courses on risk analysis to hundreds of federal
9 officials, including over 100 federal judges, Congressional staff, and FDA officials. I have also
10 taught hundreds of state judges about risk analysis. Risk, uncertainty, risk analysis and hazard
11 warnings have all played an important part in these courses.

12 Q: Going back to your employment history -- have you ever been employed as an
13 economist other than as a professor?

14 A: Yes. I have held two full-time positions in the federal government. Recently, I was also
15 a full-time employee of EPA while on sabbatical from teaching one year.

16 Q: What was your first position working as an economist in the U.S. government?

17 A: From 1979 to 1981, I was the deputy director of the President's Council on Wage and
18 Price Stability. This was a senior position within the executive office of the President during the
19 Carter administration. The primary purpose of the Council was to provide executive branch
20 oversight for all major new federal regulations and to bring inflation under control, which was a
21 major problem at the time. We also had input through Alfred Kahn, the chairman of the Council
22 on Wage and Price Stability, on all major economic policies, since we were a member of the
23 economic policy group, which was the cabinet-level group dealing with economic policy in the

1 Carter administration.

2 Q: Why did you leave that position in 1981?

3 A: I worked for President Carter, so when Ronald Reagan became the President, it was time
4 for me to move on. In fact, President Reagan eliminated the Council on Wage and Price
5 Stability and moved many of its functions to the Office of Management and Budget.

6 Q: Where did you go from there?

7 A: From there, I went to the National Commission on Employment Policy where I worked
8 on various economic analyses of employment issues.

9 Q: What were your job duties at the Commission on Employment Policy?

10 A: I began my work on hazard warnings for risks in the workplace and also did work on
11 current employment policy issues. I eventually testified before Congress as part of my efforts
12 there.

13 Q: Have you testified before Congress on other occasions?

14 A: Yes, I have. I believe I have testified before Congress nine or ten times. For example, I
15 testified before the Senate Commerce Committee, chaired by Senator Gore at the time, on
16 alcoholic beverage warnings. Those are the warnings that you now see on beer bottles. I've also
17 testified on behalf of the tobacco industry in public hearings regarding proposed OSHA
18 regulation of environmental tobacco smoke.

19 Q: In each instance, were you testifying as an expert on economic and risk analysis
20 issues?

21 A: Yes.

22 Q: What other work have you done for the federal government?

23 A: As I mentioned earlier, I was a full-time employee of the EPA while I was on sabbatical

1 from teaching. I also served on the EPA Science Advisory Board for the legal term limit of
2 seven years, and I have been on another EPA Science Advisory Board for the Clean Air Act. In
3 addition, I have been told that I will soon be appointed to the newly formed U.S. Environmental
4 Protection Agency Science Advisory Board's ad hoc Committee on Homeland Security.

5 Q: Anything else?

6 A: Yes. Though I left the Council of Wage and Price Stability when President Reagan was
7 elected, the Reagan administration subsequently asked me to get involved in a major policy
8 controversy. In 1982, there was a dispute between the Occupational Safety and Health
9 Administration and the Office of Management and Budget over whether OSHA could issue a
10 new regulation requiring that dangerous chemicals in the workplace be labeled. Until that time
11 there was no requirement that dangerous chemicals be labeled. OSHA did an analysis of the
12 costs and benefits of the regulation, and proposed the regulation known as the hazard
13 communication regulation. However, their proposal was rejected by the OMB, which claimed
14 that the costs were in excess of the benefits. OSHA then appealed that decision to then Vice-
15 President Bush, who concluded that it was a technical issue and that an expert should be brought
16 in to settle it. I was asked by the Secretary of Labor and OMB to settle the dispute between the
17 two agencies. This was the most expensive regulation that the Reagan administration had
18 considered up to that point, so it was a major battle.

19 Q: What was the outcome?

20 A: My report showed that the benefits did in fact exceed the costs, and I concluded that the
21 regulation should be issued. According to the THE NEW YORK TIMES, the day after my report in
22 favor of the regulation reached the Reagan White House, the regulation was issued. One set of
23 items that came out of this regulation are the Material Safety Data Sheets now found in

1 workplaces across the country.

2 C. Publications

3 Q: In addition to your teaching duties, do you also do research in the field of risk
4 analysis and risk perception?

5 A: Yes. I have since I started work on my Ph.D.

6 Q: Have you published any articles on risk perception and hazard warnings?

7 A: Yes. In total, I have written or co-authored over 200 articles, and many of those deal
8 with risk perception, hazard warnings, and various government risk regulation programs.

9 Q: How does your record of publishing compare to that of other economists?

10 A: I am currently ranked seventh among all economists in the world in terms of articles
11 published in the top peer-reviewed journals. In terms of the number of times I am cited by other
12 economists in peer-reviewed journals, I am one of the top 25 economists in the world.

13 Q: Have you written any articles specifically dealing with smoking risks?

14 A: Yes. Some of the articles I have written that deal specifically with smoking risks are:

- 15 • *Do Smokers Underestimate Risks?*, JOURNAL OF POLITICAL ECONOMY (1990) JE-
16 060512;
- 17 • *Age Variations in Risk Perceptions and Smoking Decisions*, THE REVIEW OF
18 ECONOMICS AND STATISTICS (1991) JD-023098;
- 19 • *Cigarette Warnings: The Perils of the Cipollone Decision*, SUPREME COURT
20 ECONOMIC REVIEW (1993) JD-023096;
- 21 • *Constructive Cigarette Regulation*, DUKE LAW JOURNAL (1998) JD-023117;
- 22 • *The Governmental Composition of the Insurance Costs of Smoking*, JOURNAL OF
23 LAW AND ECONOMICS (1999) JD-023091;
- 24 • *Public Perception of Smoking Risks*, in Jeanrebaud et al., VALUING THE COST OF
25 SMOKING: ASSESSMENT METHODS, RISK PERCEPTION AND POLICY OPTIONS (1999)
26 JD-025183;
- 27
- 28
- 29
- 30
- 31
- 32

1 • *Comment: The Perils of Qualitative Smoking Risk Measures*, JOURNAL OF
2 BEHAVIORAL DECISIONS MAKING (2000) JE-063835.

3 Q: Have you also written books on the general subject of risk analysis?

4 A: Yes. I have written over 20 books, most of which deal with some aspect of risk analysis.

5 Almost all of my books have been peer-reviewed and were published by university presses.

6 Q: Have any of your books focused specifically on smoking risks?

7 A: Yes. Two of my books, SMOKING: MAKING THE RISKY DECISION and SMOKE-FILLED
8 ROOMS, have focused exclusively on smoking risks. In addition, a chapter of RATIONAL RISK
9 POLICY is devoted to smoking risks.

10 Q: What topics are addressed in SMOKING: MAKING THE RISKY DECISION, JD-004648?

11 A: This book is entirely about smoking and smoking risks. It looks at some of the sources of
12 information about the risks of smoking that have been available to the public over time. It also
13 analyzes how people assess the risks of smoking, what their risk perceptions are, and how those
14 risk perceptions affect smoking behavior. In addition, the book explains how changes in the
15 price of cigarettes affect cigarette consumption. While the book was published in 1992, it
16 discusses some of the core material I will present in my testimony, here.

17 Q: And what about SMOKE-FILLED ROOMS, JD-004645? What is it about?

18 A: SMOKE-FILLED ROOMS was published in 2002. It includes chapters on risk perceptions
19 and addiction, youth smoking, environmental tobacco smoke, and the promotion of potentially
20 safer cigarettes. It also covers the settlement of the state litigation against the tobacco industry,
21 the Master Settlement Agreement, and the financial costs of smoking. In addition, the book
22 includes responses to a variety of issues raised by Professors Slovic and Weinstein. The book
23 synthesizes many of the materials found on my reliance list in this case.

1 Q: The two books you mentioned that you wrote regarding smoking, were they peer
2 reviewed?

3 A: Yes. And my other book, RATIONAL RISK POLICY, JD-022735, which includes a chapter
4 on smoking risks, was also peer reviewed.

5 Q: The Court has heard testimony how journal articles get reviewed. How is a book
6 peer reviewed?

7 A: For these books the process was just like a journal article. The publishers, Oxford
8 University Press and University of Chicago Press, sent the manuscripts to scholars in the relevant
9 field for blind peer review. Those scholars provided written comments on the manuscripts.
10 Before making a publication commitment a review board at each of these university presses
11 reviewed my treatment of the comments to ascertain that my methodology was sound and that
12 the book made an original contribution to the field.

13 Q: Have you written any other books that address smoking risks specifically?

14 A: I edited a book called REGULATION THROUGH LITIGATION, which was published by
15 Brookings and American Enterprise Institute. It contains a chapter on tobacco. The focus of the
16 chapter is the use of tobacco litigation to force regulatory changes and tax increases. It is
17 primarily a review of the state litigation against the cigarette industry, but it also includes some
18 of the evidence with respect to risk beliefs and awareness.

19 Q: Have you won any awards for the economics research – books or articles – that you
20 have published?

21 A: Yes. I have won the “Article of the Year” award from the Western Economic
22 Association; the “Article of the Year” award from the Royal Economic Society, an international
23 economic society based in England; the “Article of the Year” award from the American Risk and

1 Insurance Association; and I am a four-time winner of the “Book of the Year” award given out
2 by the American Risk and Insurance Association.

3 Q: In addition to your own publishing, have you held any editorial positions on
4 economic journals?

5 A: Yes. I have served on more than ten editorial boards, including the editorial board for the
6 AMERICAN ECONOMIC REVIEW, which is the official journal of the American Economic
7 Association. I have also been on the editorial board for the REVIEW OF ECONOMICS AND
8 STATISTICS, which is Harvard's journal. In addition, I am the founding editor of the JOURNAL OF
9 RISK AND UNCERTAINTY.

10 Q: And have you served as a peer-reviewer for other publications or organizations?

11 A: Yes, regularly. I have served as a peer-reviewer for dozens of publications as well as for
12 government agencies from countries throughout the world.

13 D. Consulting Work

14 Q: Other than your work as an expert witness, have you done any consulting work in
15 the area of risk analysis?

16 A: Yes. My consulting engagements are too numerous to list them all here, but I can give
17 you a few examples. I have done consulting work for a number of companies, including Bic,
18 Dupont, and UPS, on risk perception and hazard warnings design. In the same vein, I briefly
19 consulted with R.J. Reynolds on the design of a fire hazard warning for their Premier cigarette in
20 the late 1980s.

21 Q: Have you also done consulting work for, or received research grants from, any
22 governmental entities, or other institutions?

23 A: Yes. I have worked with a number of governmental entities and other organizations on

1 risk analysis issues, including the following:

- 2 • The National Science Foundation (Review of the US Consumer Product Safety
3 Commission regulations and safety codes)
- 4
- 5 • The National Bureau for Economic Research (A study on the social cost of
6 smoking and co-chair of the annual conference on law and economics)
- 7
- 8 • The Brookings Institution Product Liability (Director of a project on regulation
9 by litigation)
- 10
- 11 • National Oceanic and Atmospheric Administration (Helped develop a survey
12 designed to value the damages from the Exxon Valdez)
- 13
- 14 • U.S. Department of Labor (project director, miscellaneous contracts and purchase
15 orders)
- 16
- 17 • U.S. General Accounting Office (consulting contract)
- 18
- 19 • U.S. Office of Management & Budget (consulting contract; disease compensation)
- 20
- 21 • Executive Office of the President (consulting contract; wealth effects and risk
22 policy analysis);
- 23
- 24 • Environmental Protection Agency (funded continuously on a variety of research
25 projects since 1983).
- 26

27 I have done a significant amount of work for the Environmental Protection Agency. I have been
28 conducting surveys and other studies for the EPA on a continuing basis since 1983. In fact, I am
29 now writing the report on a major national survey that we developed for EPA to determine the
30 value of water quality, the value of clean lakes, rivers, and streams. In the past, I have consulted
31 with the EPA on public smoking restrictions.

32 Q: Are you currently engaged in any outside consulting work, other than your work for
33 EPA?

34 A: Yes. In addition to my ongoing work for the EPA, I currently have a contract through a
35 consulting firm to prepare an analysis of medical malpractice data for the Department of Health
36 and Human Services.

1 E. Litigation/Expert Witness Work

2 Q: Let's talk about your work as an expert witness in litigation for a moment. Have
3 you been employed as an expert by these defendants in other cases?

4 A: Yes. I have testified at trial eight times for these defendants, I believe, and have been
5 deposed in somewhere around 25 different tobacco cases.

6 Q: Approximately how much have you been paid for your work in this case?

7 A: Just under \$85,000, but that amount does not include the work I have done in the past
8 several weeks preparing my written direct testimony.

9 Q: Are these defendants the only parties who have retained you as an expert witness?

10 A: No. In two-thirds or maybe more of the cases in which I have been retained as an expert
11 it has not been for tobacco issues.

12 Q: Do you always testify for the defense?

13 A: No. In fact, in the majority of cases in which I have been retained as an expert, I have
14 been retained by plaintiffs.

15 Q: Has the Department of Justice ever retained you as an expert witness or a litigation
16 consultant?

17 A: Yes. In fact, I have been an expert for the Justice Department in a variety of cases,
18 including one of the very first cases I ever worked on. That case involved the computation of
19 economic damages associated with airplane crashes. I also worked for the Justice Department on
20 a case involving allegations of race discrimination against the town of Cicero, Illinois, which is
21 contiguous to the City of Chicago. I also did some work on punitive damages issues for the
22 Department of Justice in connection with the Exxon Valdez incident. For that matter, I was
23 retained jointly as an expert for both NOAA and the Department of Justice.

1 II. SOURCES OF SMOKING RISK AWARENESS.

2 A. Sources of Information About the Risks of Smoking

3 Q: In general, what sources have you considered in assessing the public's access to
4 health risk information and its awareness of the health risks of smoking?

5 A: My historical sources can be divided into two broad categories. First, I evaluated the
6 various types and sources of information that have been presented to the public about the health
7 risks of smoking, over time. Second, I investigated various indicators of actual awareness on the
8 part of the public.

9 Q: Starting with your first category, please identify some of the major sources of
10 information about the risks of smoking that have been available to the public over time.

11 A: Smoking is perhaps the most highly publicized risk in the United States. Over time there
12 have been many sources of information about the risks of smoking. Such information has been
13 provided by members of the public health community, including the Surgeon General and the
14 Secretary of HEW (now called HHS), and by public health organizations, such as the American
15 Heart Association, the American Cancer Society, and the Centers for Disease Control. The
16 Surgeon General's warnings that have appeared on cigarette packages since the mid-1960s have
17 also been an important source of information about the health risks of smoking.

18 Information about the risks of smoking has been widely disseminated in the mass media,
19 including through radio and television announcements, news reports, and magazines and
20 newspaper articles. In addition, people have heard about the risks of smoking from their
21 teachers, as part of school-based educational programs, as well as from their parents and friends.
22 Today, various community-wide and school-based anti-smoking intervention programs provide
23 additional information about the health risks of smoking. There are also numerous internet sites,

1 including tobacco company websites, that provide information on the health risks of smoking.

2 Q: And with respect to your second category, what did you look to for indications of
3 actual awareness on the part of the public?

4 A: I have looked primarily at three sources. They are contemporaneous statements made by
5 public health officials, polls and survey data, and empirical data that provide evidence of how
6 risk awareness has been reflected in consumer behavior and decision making.

7 1. Statements by Public Health Figures

8 Q: Let's start with the sources of smoking and health information. You mentioned
9 public health figures. Who were some of the public health figures who were important
10 sources of information about the health risks of smoking?

11 A: I consider the Surgeon General one of the most important public health figures, in terms
12 of providing information about the health risks of smoking over time.

13 Q: What has the Surgeon General said about the health risks of smoking?

14 A: In 1964, the Surgeon General issued a landmark report on cigarette smoking, which
15 attracted widespread attention. The report concluded that cigarette smoking was causally related
16 to lung cancer in men. JE-059895. Since that time the Surgeon General has issued many other
17 widely publicized reports on the health risks of smoking on almost an annual basis.

18 Q: In general terms, what topics have these subsequent reports addressed?

19 A: These Reports have considered the health consequences of smoking. They have
20 considered the relationship between cigarette smoking and certain specific diseases, such as lung
21 cancer, cardiovascular disease and chronic obstructive lung disease. Table 2-3 in my book,
22 SMOKING: MAKING THE RISKY DECISION, lists the general topics covered by the reports through
23 1990, and is reproduced below.

1 Table 2-3 The Surgeon General's Reports on smoking

3	1967	The Health Consequences of Smoking
4	1968	Supplement to the 1967 Public Health Service Review
5	1969	Supplement to the 1967 Public Health Service Review
6	1970	No Report
7	1971	The Health Consequences of Smoking
8	1972	The Health Consequences of Smoking
9	1973	The Health Consequences of Smoking
10	1974	The Health Consequences of Smoking
11	1975	The Health Consequences of Smoking
12	1976	The Health Consequences of Smoking: Selected Chapters from the 1971-1975 Reports
13	1977-78	(one edition) The Health Consequences of Smoking
14	1979	Smoking and Health
15		--The Health Consequences of Smoking
16		--The Behavioral Aspects of Smoking
17		--Education and Prevention
18	1980	The Health Consequences of Smoking for Women
19	1981	The Health Consequences of Smoking: The Changing Cigarette
20	1982	The Health Consequences of Smoking: Cancer
21	1983	The Health Consequences of Smoking: Cardiovascular Disease
22	1984	The Health Consequences of Smoking: Chronic Obstructive Lung Disease
23	1985	The Health Consequences of Smoking: Cancer and Chronic Lung Disease in the Workplace
24	1986	The Health Consequences of Involuntary Smoking
25	1987	No Report
26	1988	The Health Consequences of Smoking: Nicotine Addiction
27	1989	Reducing the Health Consequences of Smoking: 25 Years of Progress
28	1990	The Health Benefits of Smoking Cessation

29
30 Q: You said there were other public health organizations that also provided
31 information about the health risks of smoking. Could you identify some of those?

32 A: Other important public health sources of risk information include the American Cancer
33 Society, the American Lung Association, the American Medical Association, the American
34 Heart Association, the National Cancer Institute, and the Centers for Disease Control. In
35 addition, the National Clearinghouse for Smoking and Health was a federal agency charged with
36 disseminating information about the health risks of smoking. Over time, these groups
37 collectively have also provided substantial information regarding the health risks of smoking
38 through nearly every channel of communication possible, including broadcast media campaigns,
39 pamphlets, and advertisements.

40 Q: Can you provide any examples of efforts made by these groups to inform the public

1 of the health risks of smoking?

2 A: Sure. Several public health organizations have sponsored major media campaigns to

3 prevent smoking initiation and/or promote smoking cessation. For example the American

4 Cancer Society has sponsored *The Great American Smokeout* smoking cessation campaign every

5 year since 1977. JD-003216. These organizations have also provided information about the

6 health risks of smoking in anti-smoking television and radio advertisements, and in posters and

7 magazine ads.

8 Q: How consistent have these messages from the public health community about the

9 risks of smoking been?

10 A: They have been delivered consistently for at least the past 40 years.

11 2. Media Coverage

12 a. Magazines

13 Q: Let's look at another source of information you mentioned -- media coverage. How

14 have print and broadcast media informed the public about the risks of smoking?

15 A: The health risks of smoking have been publicized in the print and broadcast media for

16 decades. The media has consistently reported new or updated results of smoking and health

17 research, as well as any new public health conclusions about the relationship between smoking

18 and various diseases. The media also has run a variety of feature stories in which issues such as

19 addiction, the results of lawsuits relating to smoking, or challenged practices of members of the

20 tobacco industry have been investigated and reported.

21 Q: Let's start with print media. Can you identify some of the major magazines that

22 have covered the health risks of smoking, through the years?

23 A: As I describe in my first book on smoking, SMOKING: MAKING THE RISKY DECISION, JD-

1 004648, there has been widespread coverage of smoking risk research in the media. Virtually all
2 major news magazines, including LIFE, TIME, US NEWS & WORLD REPORTS, and NEWSWEEK,
3 have covered the health risks of smoking. I have done literature searches and turned up
4 thousands of articles about smoking risks. For example, after the 1964 Surgeon General's
5 Report came out, all four of the magazines I just named ran articles covering the Report. JD-
6 000229; JD-000225; JD-000308; JD-000227. Since that time, the Surgeon General has issued
7 several reports on the health risks of smoking and these reports have generally received extensive
8 media coverage as well.

9 Q: What were some of the other important smoking and health stories covered in these
10 and other popular magazines in the 1950s and 1960s?

11 A: There were many stories about contemporary scientific research and research results.
12 For instance, the Wynder and Graham mouse skin painting experiments received extensive
13 coverage in 1953, and the Hammond and Horn studies linking smoking to lung cancer received
14 similar coverage in 1954. READER'S DIGEST, LIFE, and TIME all reported on Wynder and
15 Graham's research, JD-000755; JD-000621; JD-011181, and the Hammond and Horn studies
16 were reported in TIME, NEWSWEEK and U.S. NEWS & WORLD REPORT, JD-000137; JD-002587;
17 JD-000136.

18 Q: Have other popular magazines reported on the health risks of smoking?

19 A: Yes, many have. As I point out in my first book on smoking, "One instructive measure
20 of the continuity of the media coverage [of the health risks of smoking] is the tally of articles
21 dealing with smoking hazards that have appeared in Reader's Digest" over time. JD-004648. In
22 that book, I showed in Table 2-6 the number of articles relating to smoking and health risks that
23 ran in READER'S DIGEST from 1950 – 1988. As that table shows, READER'S DIGEST ran 71

1 articles on the health risks of smoking during that time period, including 12 articles in the 1950s
2 and 17 articles in the 1960s.

3 Q: You said your chart starts in the 1950s. Is that when READER's DIGEST first started
4 covering smoking and health issues?

5 A: No. READER's DIGEST ran articles on smoking and health issues at least as far back as
6 the 1930s and 1940s. JD-000072; JD-000076; JD-000077; JD-000078; JD-021412; JD-000082.

7 Q: What were some of the articles on smoking published in READER's DIGEST in the
8 1950s and 1960s?

9 A: During that timeframe, READER's DIGEST published articles such as *How Harmful Are*
10 *Cigarettes?* (April 1950), JD-000092; *Cancer by the Carton* (December 1952), JD-002597; *Lung*
11 *Cancer and Cigarettes: Here Are the Latest Findings* (June 1962), JD-000200; *The Facts*
12 *Behind the Cigarette Controversy* (July 1954), JD-011181; *The Cigarette Controversy: A Storm*
13 *is Brewing* (August 1963), JD-000211; and *Cigarettes – Tried and Found Guilty* (April 1964),
14 JD-000235.

15 Q: Did those articles specifically report on the health risks of smoking?

16 A: Yes. For example, the article *Lung Cancer and Cigarettes: Here Are the Latest*
17 *Findings*, which ran in June 1962, reported that The Royal College of Physicians had stated
18 unequivocally: "Cigarette smoking is a cause of lung cancer and bronchitis...." JD-000200.

19 Q: Did the READER's DIGEST articles also include coverage of the research results of
20 scientists like Wynder and Graham?

21 A: Yes, they did. In January 1950, READER's DIGEST ran an article entitled *How Harmful*
22 *Are Cigarettes?*, which reported on Wynder and Graham's research. It called their research "the
23 most extensive and reliable research yet made in this field," and noted that it was "expected to

1 show that over 95 percent of patients with lung cancer smoke a pack of cigarettes a day or more,
2 and have done so for many years.” JD-004646.

b. Newspapers

4 Q: You mentioned earlier that the health risks of smoking were also reported in
5 newspapers across the country?

6 A: Yes, quite extensively.

7 Q: Can you provide a few examples of the types of stories about the health risks of
8 smoking that were reported in the newspapers?

9 A: Sure. Newspapers covered many of the same research findings that were reported in
10 magazines. For example, the 1964 Surgeon General's Report was widely reported in newspapers
11 across the country. Prior to that, there was also widespread newspaper coverage of the research
12 conducted by Wynder and Graham linking cigarette smoking to lung cancer. For example, on
13 May 27, 1950 THE NEW YORK TIMES reported Wynder and Graham's findings that "Among the
14 male cancer patients, 94.1 per cent were cigarette smokers, 4.0 per cent pipe smokers and 3.5 per
15 cent were cigar smokers." JD-000098.

16 Q: How prominently were these stories featured?

17 A: Many were front page news. For example, the 1964 Surgeon General's Report was front
18 page news at newspapers across the country. The Report's conclusions were reported on the
19 front page of THE NEW YORK TIMES, JD-025112; the CHICAGO TRIBUNE JD-025113; THE
20 WASHINGTON POST, JD-021456; and the LOS ANGELES TIMES, JD-025111; and many other
21 newspapers.

22 Q: Can you think of other instances in which the risks of smoking were reported as
23 front page news?

1 A: There were quite a few. An illustrative example would be when HEW Secretary Joseph
2 Califano declared a "war" on smoking in 1978. The story made the front page of the
3 WASHINGTON STAR on January 11, 1978, which reported that Califano had called smoking a
4 form of "slow motion suicide" and "proclaimed smoking 'Public Health Enemy Number One in
5 the United States.'" JD-013149.

6 c. Television and Radio

7 Q: You also mentioned that the health risks of smoking were publicized in television
8 and radio stories and spots?

9 A: Yes. Television and radio news programs covered the major smoking and health research
10 findings, such as the Surgeon General's reports and statements by other public health officials,
11 just as the print media did.

12 Q: Can you provide some examples?

13 A: Yes. Both the 1964 Surgeon General's Report and the 1969 supplement to that Report
14 were reported on the nightly news. Similarly, Califano's declaration of war on cigarette smoking
15 in 1978, was reported on television news broadcasts. Another example would be statements
16 about the health risks of smoking made by Surgeon General Koop in the 1980s and by President
17 Clinton in the 1990s. These were also televised.

18 Q: Were the health risks of smoking communicated on television other than through
19 TV news broadcasts?

20 A: Yes, they were televised in other ways. For example, anti-smoking advertisements were
21 televised from 1968 to 1970 under the Fairness Doctrine.

22 3. Product Warnings

23 Q: You also identified product warnings as a source of public information about health

1 risks. When did health warnings first appear on cigarette packages?
2 A: Health warnings were mandated in 1965 and first included on cigarette packages in 1966,
3 not long after the 1964 Surgeon General's Report, and have remained on the packs since then.
4 Cigarette product warnings were probably a particularly salient form of health information for
5 the public at that time, because the warnings that appeared on cigarette packages were at the
6 forefront of the policies that have put warnings on consumer products.

7 Q: What did the first on-package cigarette warnings say?

8 A: The first warning emphasized the probabilistic character of the risks. It stated: "Caution:
9 Cigarette Smoking May Be Hazardous to Your Health."

10 Q: Have the warnings changed over time?

11 A: Yes, they have. Table 2-4 in my book, SMOKING: MAKING THE RISKY DECISION, which
12 is reproduced below, shows the evolution of the warnings over time.

13

<u>Warning Period</u>	<u>Cigarette warning content summaries</u>
17 Cigarette warning, 1965	18 "Caution: Cigarette Smoking May Be Hazardous to Your Health"
19 Cigarette warning, 1969	20 "Warning: The Surgeon General Has Determined That Cigarette 21 Smoking Is Dangerous to Your Health"
22 Cigarette warning, 1984	23 1. SURGEON GENERAL'S WARNING: Smoking Causes Lung Cancer, Heart 24 Disease, Emphysema, and May Complicate Pregnancy" 25 2. "SURGEON GENERAL'S WARNING: Quitting Smoking Now Greatly Reduces 26 Serious Risks to Your Health" 27 3. "SURGEON GENERAL'S WARNING: Smoking by Pregnant Women May Result 28 in Fetal Injury, Premature Birth, and Low Birth Weight" 29 4. "SURGEON GENERAL'S WARNING: Cigarette Smoke Contains Carbon 30 Monoxide"

33
34 Q: Was the change from "Caution" to "Warning" in 1969 significant?

1 A: Yes. In the hierarchy of the conventional warnings vocabulary of the American National
2 Standards Institute, "Warning" provides a stronger alert to a potential hazard than does the term
3 "Caution."

4 Q: You have listed four different warnings for 1984 onward. Why is that?

5 A: In 1984, Congress mandated a series of rotating warnings covering a variety of smoking
6 risks ranging from lung cancer to birth defects. The four warnings listed in Table 2-4 are the
7 warnings labels that have been rotated on cigarette packages since 1984.

8 Q: Why the change to rotating warnings?

9 A: The Federal Trade Commission (FTC) hypothesized that a series of rotating warnings
10 would enhance people's risk perceptions by providing a fresh message that consumers would be
11 more likely to read.

12 Q: Do these warnings appear only on cigarette packages?

13 A: No; they are also included on all cigarette advertisements and, thus, more broadly
14 available.

15 4. School-Based Programs

16 Q: You also mentioned school-based educational programs as a source of information
17 about the risks of smoking?

18 A: Yes. School-based educational programs on the health risks of smoking have been
19 around for decades and continue today. Education of youth with respect to the potential hazards
20 of smoking has occurred through textbooks required for use in schools and teacher presentations.

21 Q: What types of information is provided in these textbooks?

22 A: These textbooks discuss the health risks of smoking generally, and some also include a
23 discussion of the risks of environmental tobacco smoke. Two examples cited in my second book

1 about smoking, SMOKE-FILLED ROOMS, are Ted Tsumara's book HEALTH AND SAFETY FOR YOU
2 (McGraw Hill, 1987) and the textbook HEALTH (Prentice-Hall 1997), which includes a chapter
3 called "Tobacco."

4 Q: Were there other educational efforts carried out in schools?

5 A: Yes. I plan to discuss the Hutchinson study later on, which was a particular type of
6 school-based intervention. But many schools have formally structured smoking prevention
7 programs in line with CDC and NCI's standards for such programs. Non-government public
8 health organizations have also assisted in school-based educational efforts.

9 5. Parents

10 Q: You also mentioned that parents are a source of information regarding the health
11 risks of smoking?

12 A: Yes. Parents generally provide their children with information about the health risks of
13 smoking. In recognition of this fact, many public health organizations have started providing
14 advice to parents about how to effectively communicate the risks of smoking to their children.
15 Examples of such organizations include the Mayo Clinic, the National Institute on Drug Abuse,
16 and the Center for Disease Control.

17 6. Cigarette Advertisements

18 Q: You also mentioned that certain cigarette advertisements from the 1950s and the
19 1960s contributed to the public's perceptions of the health risks of smoking. Would you
20 explain?

21 A: During that era, cigarette companies ran ads with comparative risk statements that had the
22 net effect of calling the public's attention to the health hazards of cigarettes. Because of the
23 prominence of consumer concerns regarding the health consequences of smoking, one potential

1 way for a cigarette manufacturer to gain a competitive advantage is to make claims that its
2 product is comparatively less harmful in that regard. The willingness to mention health risks in
3 an ad is an implicit recognition that the safety of the product was a salient consumer concern.
4 Even as early as the 1920s, health claims were a prominent part of cigarette advertising. Those
5 types of claims can be seen into the 1950s and early 1960s, and even earlier. For example, in my
6 book, SMOKING: MAKING THE RISKY DECISION, I discuss a 1935 Camel ad, which suggested that
7 a Camel smoker is less likely to become winded since it is a “milder” cigarette,” and a 1953 Kent
8 ad, which touted the ability of cigarette filters to remove tar and other controversial compounds
9 from cigarette smoke. JD-004648.

10 Q: Did these types of advertisements influence consumers’ perceptions of the health
11 risks of smoking?

12 A: Yes. That type of advertising tends to stigmatize the entire product group.

13 Q: How were those ads perceived at the time by professionals in the advertising
14 industry?

15 A: As I note in my first book on smoking, in 1953 BUSINESS WEEK questioned the economic
16 wisdom of the industry’s strategy: “Why has the industry persisted in this negative form of
17 advertising even when, as tobacco growers and others complain, it hurts the trade by making
18 people conscious that cigarettes may be harmful?” JD-004648.

19 B. Historical Confirmations of Awareness

20 Q: You have described a variety of sources of risk information available to the public.
21 What sources have you looked at to assess the public’s awareness of the health risks of
22 smoking?

23 A: I have looked primarily at three sources: polls and survey data, statements made by

1 public health officials, and empirical data that reflect consumer decisions and behaviors. More
2 specifically, I analyzed as a limited survey, data that was available for that time primarily to see
3 what information people had heard based on these surveys. I examined the statements of public
4 health officials to see what information was in the public domain. I also analyzed patterns of
5 smoking behavior during that time period to see whether shifts in the informational environment
6 had a dramatic effect on smoking patterns.

7 Q: Were you able to draw any conclusions regarding the effectiveness of the efforts to
8 communicate the risks of smoking to the general public, based on these sources?

9 A: Yes. Each of these sources indicates that the health risks of smoking were effectively
10 communicated to the general public.

11 1. Polls and Survey Data

12 Q: Let's look first at the survey data. Aside from your own surveys, which we will
13 discuss later, what polls have you considered?

14 A: I have looked at Gallup polls, Roper surveys, and AUTC.

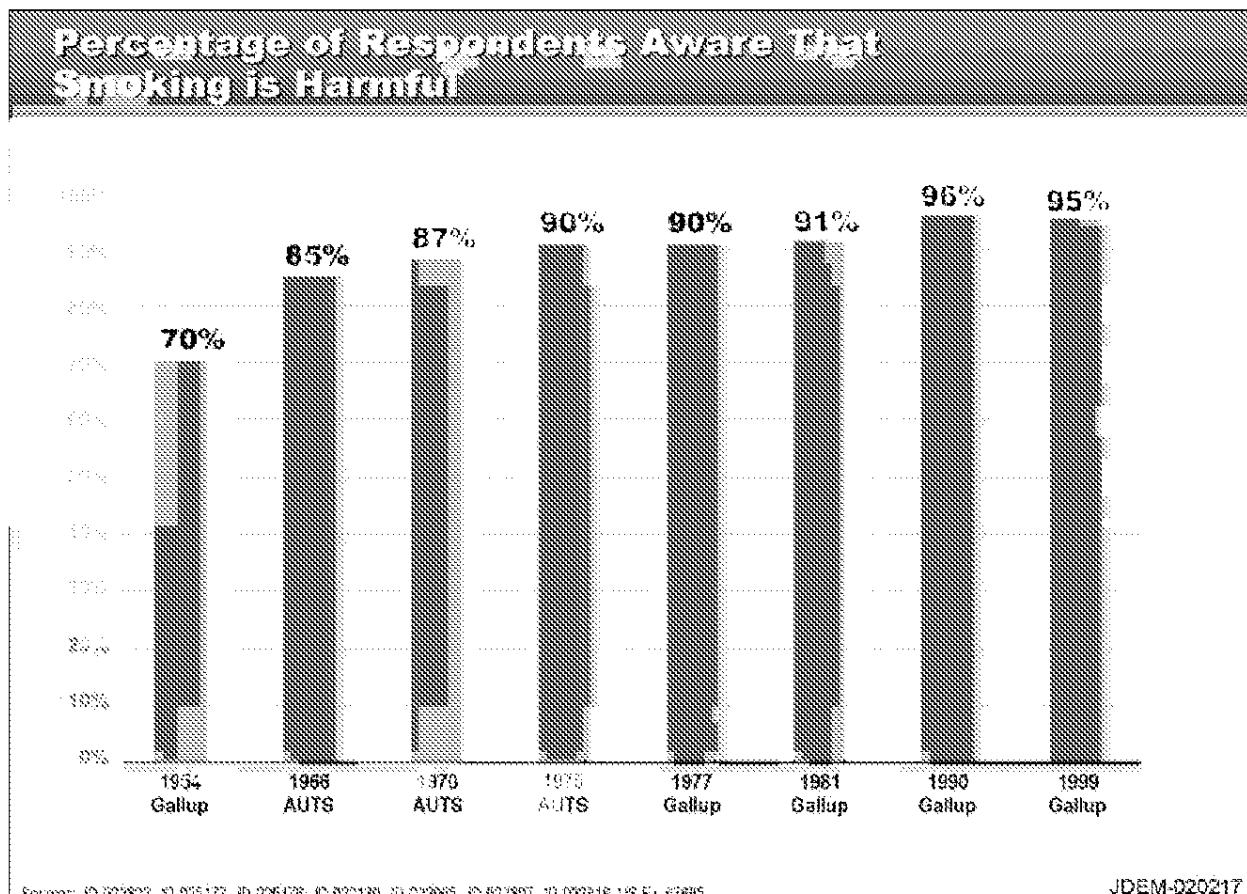
15 Q: I think most people know what Gallup polls and Roper surveys are, but what is
16 AUTC?

17 A: Adult Use of Tobacco Survey, which is administered by the government.

18 Q: Have you prepared a demonstrative depicting the answers to survey questions from
19 the 1950s through the 1990s?

20 A: Yes; it is reproduced on the next page as JDEM-020217. The demonstrative includes
21 data from both AUTC and Gallup polls. JD-022822; US Ex. 67685; JD-025177; JD-025176; JD-
22 022130; JD-022965; JD-022807; JD-022816. The percentages listed reflect the percentage of
23 AUTC respondents who strongly or mildly agreed that "Smoking cigarettes is harmful to health"

1 and the percentage of Gallup respondents who answered, "Is Harmful" when asked, "Do you
2 think that cigarette smoking is or is not harmful to your health?"



1 polls?

2 A: Yes. A January 1954 Gallup poll asked people, "Have you heard or read anything
3 recently that cigarette smoking may be a cause of cancer of the lung?" JD-022759.

4 Q: And what were the results?

5 A: In that poll, 83% of the people answering the question said yes, they had heard or read
6 that smoking might be a cause of lung cancer. JD-022759.

7 Q: Are you aware of any other polls that asked this or a similar question?

8 A: Yes. Gallup asked people the same question later that year, in June 1954, and by that
9 time number had increased to 90% of people responding that they had heard or read that smoking
10 might cause cancer of the lung. JD-004129. So, in 6 months an additional 7% reported that they
11 had heard of this smoking and health issue.

12 Q: Did you also consider a similar question that Gallup asked in 1957?

13 A: Yes, I did. That question asked: "Did you happen to hear or read about the recent report
14 of the American Cancer Society reporting the results of a study on the effects of cigarette
15 smoking?" JD-022769.

16 Q: And what was the result?

17 A: 78% of respondents said yes, they were aware of the study. JD-022769.

18 Q: How does that level of awareness, the 78% who had heard of the ACS report,
19 compare to other benchmark measures of public awareness?

20 A: It would be considered quite high. Even Dr. George Gallup, the father of modern
21 American polling, was struck by the remarkable level of awareness. Dr. Gallup called the 78%
22 figure "a phenomenal figure in polling annals." The reason is that people are being asked about
23 one specific study, and 78% of the population had heard about one narrowly defined study.

1 Q: Can you generally describe the relevant survey data from the 1960s?

2 A: Yes. I have looked at government surveys from the 1960s, and they also show

3 widespread awareness of health risks associated with smoking. For example, a 1966 survey

4 conducted for the U.S. Department of Health, Education, and Welfare (DHEW), found that

5 84.9% believed that smoking is harmful to health and that 65.5% believed that smoking shortens

6 a person's lifetime. US Ex. 67685. In that same survey, 87.2% of both smokers and never-

7 smokers knew that the 1964 Surgeon General's Report said that smoking was "harmful to

8 health." US Ex. 67685. Although respondents were less certain about more detailed findings in

9 the report, a majority gave correct answers on most of the issues about which they were

10 questioned.

11 Q: Is there similar survey data from the 1970s and 1980s?

12 A: Yes. The Roper Center asked questions about the degree of risk posed by smoking in

13 several surveys in the late 1970s and early 1980s. Even in the earliest of these surveys (1978),

14 87% of the sample (representative of adults nationwide) reported that they believed that smoking

15 posed a "high" or "moderate" risk to health. JD-022848. Another 12% characterized the risk as

16 "minor," leaving only 2% who "don't know." JD-022848. Similarly, as shown in Figure 2-3 of

17 my book SMOKING: MAKING THE RISKY DECISION, the U.S. Bureau of Alcohol, Tobacco, and

18 Firearms, Final Report of the Research Study of Public Opinion Concerning Warning Labels on

19 Containers of Alcoholic Beverages, December 1988, vol. 1, Table 2, reports the percentage of

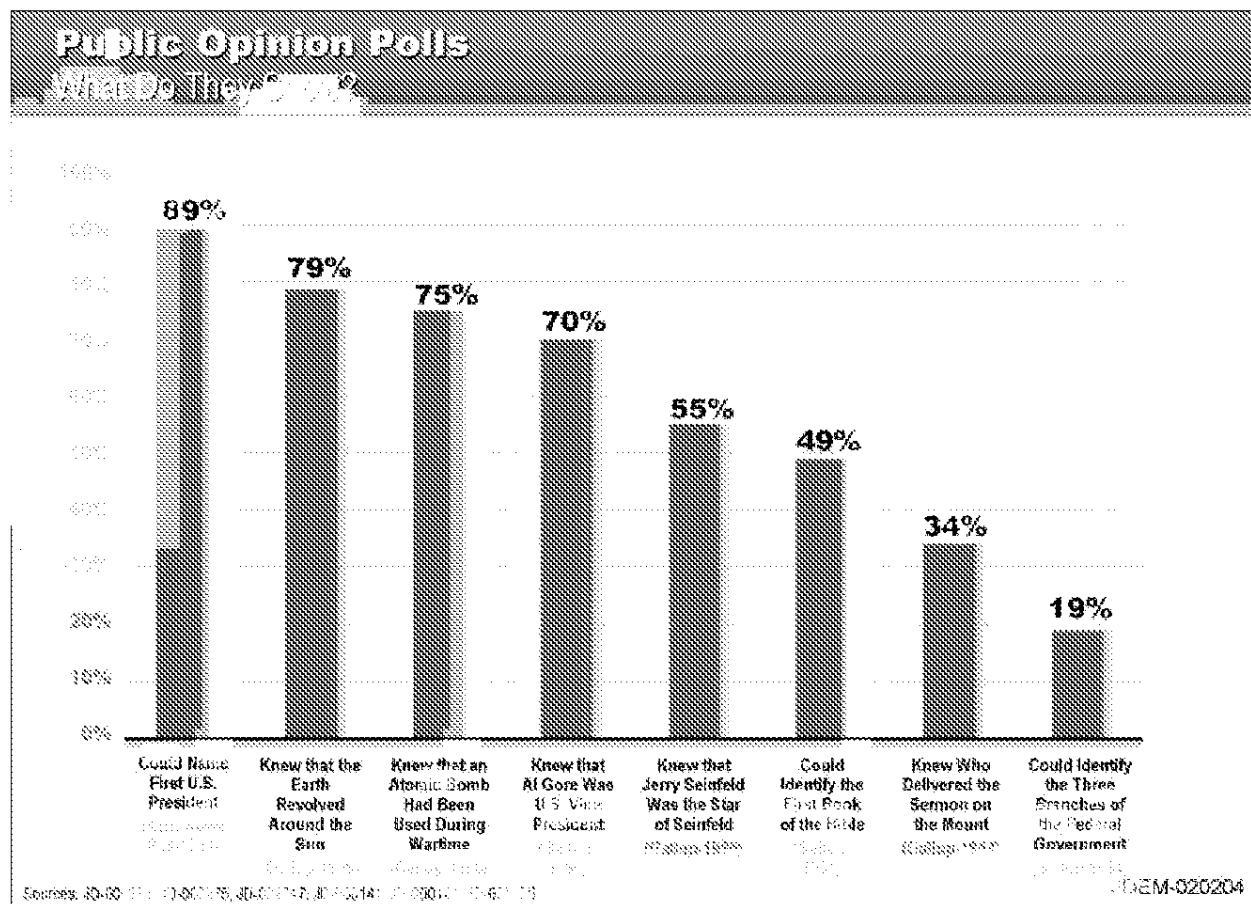
20 people who believe various products are somewhat or very harmful. JD-004648. The results

21 show that 95% of people believe tobacco products are somewhat or very harmful. JD-004648.

22 Q: Can you place a 95% awareness of a risk, as measured in public opinion polls,

23 within an appropriate context?

1 A: Yes. Comparing the percentage of people who agree that smoking is hazardous to one's
2 health with the percentage of people who are aware of certain other commonly known facts
3 shows just how robust the public's awareness of smoking risks is and has been for quite some
4 time. For example, in a 1993 ABC News poll, only 89% of people could name the first U.S.
5 President. JD-000273. In a 1999 Gallup poll, only 79% of respondents reported that they were
6 aware that the Earth revolved around the Sun. JD-025175. Similarly, in a 1996 Gallup poll, in
7 the midst of the 1996 presidential election, only 70% of people could name Al Gore as the Vice
8 President of the United States. JD-022747. In a 1954 Gallup poll, only 49% of respondents
9 could name the first book of the Bible, only 34% knew who delivered the Sermon on the Mount,
10 JD-000141, and only 19% of respondents could identify the three branches of the federal
11 government. JD-000121. These results are depicted in the chart below (JDEM-020204).



1 Sources: www.cdc.gov/tobacco/quitnow/quitnow.htm (accessed 2/20/2014) 10/26/2014 10:45:15 AM
2 Q: How do the results of these other polls help us to understand the public's awareness
3 of the health risks of smoking?
4 A: They provide a benchmark for us to gauge the public's awareness of the health risks of
5 smoking. Compared to these benchmarks, the levels of smoking risk awareness are
6 extraordinarily robust, and could properly be characterized as nearly universal. In fact, they
7 probably represent practical maximum levels. The 1989 Surgeon General's Report (US Ex.
8 63621) suggests that it may be "unrealistic to set a goal above 90 percent of smokers for public
9 knowledge," and I agree with that statement for several reasons. First, there is "noise" in
10 virtually any survey created by unexplained or unexplainable patterns of response or coding
11 errors. Second, as the Surgeon General noted, there may well be a small percentage of the public

1 that, despite all efforts to be persuaded, may resist accepting or acknowledging that information.
2 It is virtually impossible to get 100% agreement on any survey question, though, extraordinarily,
3 it sometimes happens in smaller samples or subsets of smoking risk surveys. So, estimates in the
4 90% range probably represent a practical level of “saturation” with respect to people’s reported
5 awareness of health risks, and that figure was achieved in the early to mid-1980s.

6 2. Statements by Public Health Figures

7 Q: You said that you also evaluated statements by public health figures.

8 A: Yes. I wanted to see whether public health figures believed people were getting the
9 message that smoking was hazardous to their health.

10 Q: Have they assessed the effectiveness of efforts to communicate the health risks of
11 smoking to the general public, and if so, what was the result?

12 A: I found substantial agreement among public health figures and organizations that the
13 public had been adequately warned of the health risks of smoking, as early as the 1950s and
14 1960s, and thus considerably earlier than where I place the saturation point in the 1980s.

15 Q: Can you provide some examples of the types of statements you are relying on for
16 that conclusion?

17 A: Yes. Two early and important examples come from 1957, when Dr. John Heller, the
18 director of the National Cancer Institute, made the following statement: “Newspapers, radio, TV
19 and other media have done an excellent job covering this problem and a very objective job. This
20 is an exceedingly valuable way of informing the public.” JD-042299 at 144.

21 Also in 1957, Surgeon General Leroy Burney stated: “Our position is that we have
22 informed the public through the excellent coverage of the press, radio and TV. We have
23 informed the official health agencies in the States who are responsible for this area, and we have

1 informed the American Medical Association, recognizing that many people will go to their own
2 physicians for advice.” JD-042299 at 139.

3 Q: Did other public health officials make similar statements?

4 A: Yes. For example, ten years later, Surgeon General William Stewart stated: “Today, at
5 least here in the United States, a substantial majority of the people have been exposed to the
6 scientific evidence and have accepted it.” JD-020507 at 119.

7 Q: Did the American Medical Association take a position during this time frame on the
8 effectiveness of the media coverage of the health risks of smoking?

9 A: Yes. In 1964, the AMA stated: “With respect to cigarettes, cautionary labeling cannot be
10 anticipated to serve the public interest with any particular degree of success. The health hazards
11 of excessive smoking have been well-publicized for more than 10 years and are common
12 knowledge. Labeling will not alert even the young cigaret smoker to any risks of which he is not
13 already aware.” JD-004644.

14 Q: And was that the official position of the AMA at the time?

15 A: It was their official position as published in the JOURNAL OF THE AMERICAN MEDICAL
16 ASSOCIATION.

17 Q: Are you aware of any similar statements by the American Cancer Society?

18 A: Yes. I mentioned READER’S DIGEST’s coverage of smoking and health risks earlier. In
19 1964, the American Cancer Society commended READER’S DIGEST for its extensive coverage of
20 smoking and health issues, saying it had had a “profound influence” in creating public
21 awareness of the risks involved in smoking.” JD-000234.

22 Q: Anyone else?

23 A: Yes. Dr. Daniel Horn made similar statements.

1 Q: Who was Dr. Horn?

2 A: He was a nationally prominent researcher on the lung cancer risks of cigarettes and was
3 the head of the National Clearinghouse for Smoking and Health, a federal agency entrusted with
4 the responsibility of disseminating smoking and health information.

5 Q: What opinion did he express on the effectiveness of the media coverage in informing
6 people of the risks?

7 A: He said: "You could stand on a rooftop and shout 'smoking is dangerous' at the top of
8 your lungs and you would not be telling anyone anything they did not already know." JD-
9 000253.

10 Q: When did he make that statement?

11 A: In 1968.

12 Q: So public health officials believed, as early as the 1950s and 1960s, that the public
13 had been adequately warned of the health risks of smoking?

14 A: Many did; that's correct.

15 3. Consumer Behavior

16 Q: You said you also evaluated empirical data on consumer behavior to determine
17 whether people were getting the message that smoking is hazardous; is that right?

18 A: Yes.

19 Q: What did your analysis of consumer behavior involve?

20 A: I looked at patterns of smoking behavior and how those patterns were affected by the
21 provision of hazard warnings. I also looked at the kinds of cigarettes and the amount people
22 smoked. The quantity of cigarettes the average person smoked is important, but a lot of people
23 also switched to low-tar cigarettes as they were provided new health information associating tar

1 levels with risk. So, I looked not only at per capita cigarette consumption, which tells us the
2 number of cigarettes smoked, but also at tar-adjusted consumption, which weights the number of
3 cigarettes smoked by their tar content. For purposes of my analysis, it does not matter whether
4 filtered cigarettes actually were safer, just whether people considered them to be better for their
5 health, and so made a decision to switch to filters out of concern for their health.

6 Q: What is per capita consumption?

7 A: The number of cigarettes smoked each year divided by the number of citizens.

8 Q: What did you find with respect to cigarette consumption?

9 A: I found that per capita cigarette consumption declined by 40% in the 30 year period from
10 1964 to 1994.

11 Q: How do you interpret this decline in cigarette consumption?

12 A: The decline can be explained three different ways. It might mean that fewer people
13 started smoking, that more people quit smoking, or that people continued smoking but smoked
14 fewer cigarettes.

15 Q: Regardless of the explanation, is it true that the data show that fewer cigarettes
16 were smoked, per person, in 1994 than in 1964?

17 A: Yes.

18 Q: You mentioned that you also studied the use of filtered cigarettes. Where did you
19 obtain data on the consumption of filtered cigarettes?

20 A: I took that data from the 1989 Surgeon General's Report. US Ex. 63621.

21 Q: Please explain what you found in your research on the use of filtered cigarettes.

22 A: Filtered cigarettes were introduced in the early 1950s, and became popular. By 1957,
23 38% of all cigarettes sold were filtered cigarettes, and by 1960 51% were filtered. Today

1 virtually all cigarettes sold are filtered. In short, there has been a dramatic increase in the use of
2 filtered cigarettes, starting in the 1950s.

3 Q: What conclusions can you draw, if any, about the public's perceptions of the health
4 risks of smoking based on this trend toward filtered cigarettes?

5 A: The trend toward filtered cigarettes is additional evidence that people were aware of the
6 health risks of smoking and were seeking to reduce their risks.

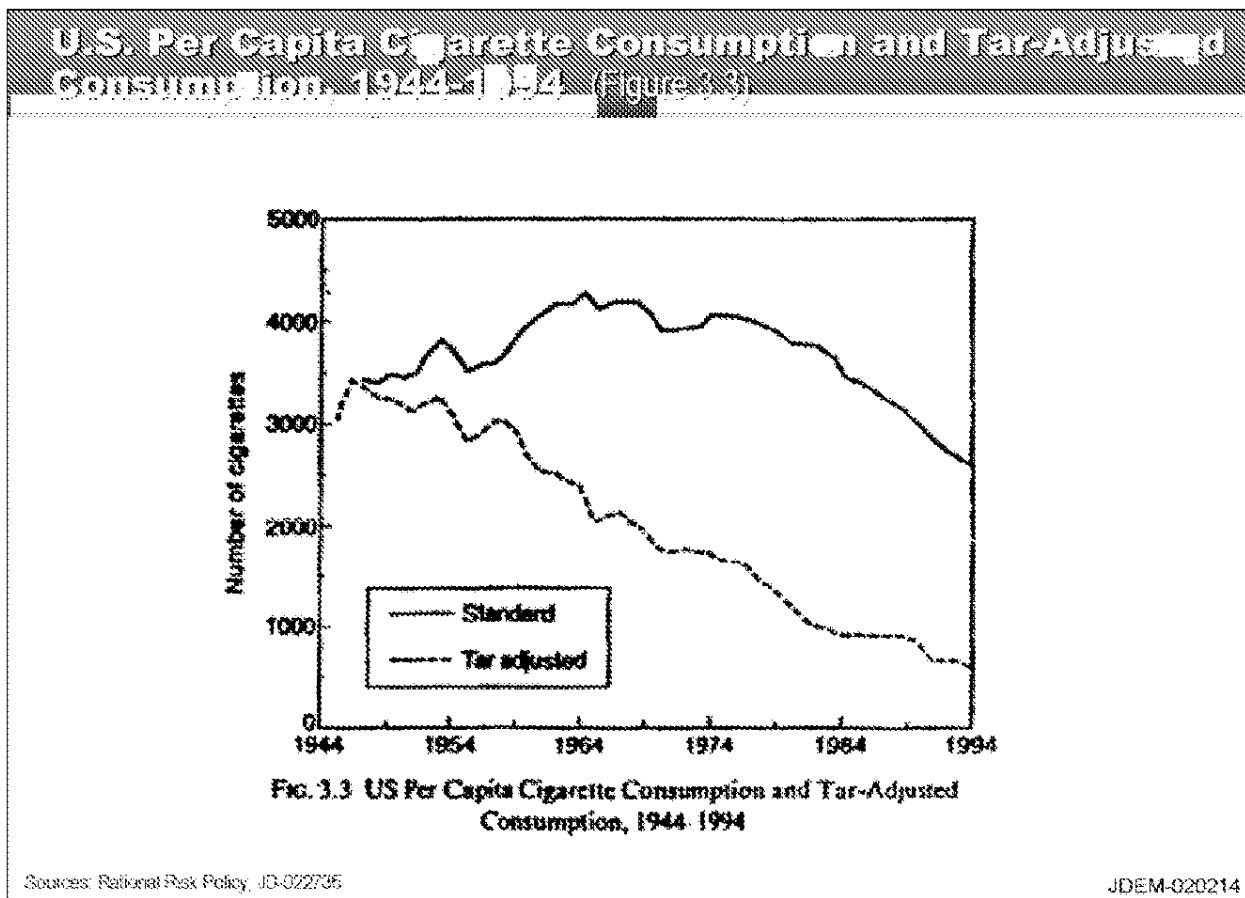
7 Q: Let's talk now about your work on tar-adjusted consumption. Is that something
8 you did just for your testimony here or is this part of your published research?

9 A: No, I did it for a study of smoking that I prepared for the National Bureau of Economic
10 Research. My analysis of the tar-adjusted trend in consumption appeared in an article in their
11 TAX POLICY AND THE ECONOMY volume, which was peer-reviewed. That same chart also
12 appears in a chapter in my book, RATIONAL RISK POLICY, which was a peer reviewed Oxford
13 University Press book, and won the book of the year award by the American Risk and Insurance
14 Association. Finally, an updated version of the tar-adjusted per capita consumption trends
15 appears in my book, SMOKE-FILLED ROOMS: A POSTMORTEM ON THE TOBACCO DEAL, which is a
16 peer reviewed book published by the University of Chicago Press.

17 Q: Please explain what the tar-adjusted consumption rate is.

18 A: The tar-adjusted consumption rate considers the tar content of the cigarette in the
19 consumption calculation using average tar content data developed by the USDA. If you switch
20 to a cigarette with half as much tar as the cigarette you used to smoke, it would count as half as
21 much. This measure captures the two ways people in the 1950s and thereafter would have
22 responded to new information that smoking may cause lung cancer: reducing the number of
23 cigarettes they smoke, and switching to cigarettes with less tar.

1 Q: Did you prepare a chart to demonstrate the trend in tar-adjusted consumption rates
2 in the 1950s and 1960s?
3 A: Yes. It is reproduced on the next page as JDEM-020214.



5 Q: Please explain this chart.
6 A: The vertical axis represents the per capita number of tar-adjusted cigarettes adults
7 smoked. So, back in the 1940s, the average adult smoked almost 3,500 cigarettes per year. By
8 the time we get to 1975, the number of tar-adjusted cigarettes smoked per year is only 1,600.
9 Thus, the tar-adjusted cigarette consumption dropped by half during that period.
10 Q: And what else of importance happened during that time period?
11 A: First, there was the so-called "tar derby." Second, the FTC allowed and then required

1 disclosure of machine-measured tar and nicotine deliveries. Finally, the government and public
2 health communities launched media campaigns encouraging consumers that if they could not or
3 would not quit, to smoke cigarettes with lower tar deliveries. All of these things led the cigarette
4 companies to compete on the basis of reduced tar levels, and as you can see, the tar-adjusted
5 consumption generally declined.

6 Q: What, if anything, does this consumption pattern indicate concerning the public's
7 perception of smoking risks during that period?

8 A: It is additional evidence that confirms that people believed that cigarette smoking is risky,
9 and that risks were correlated with tar.

10 III. ECONOMIC ANALYSIS OF DECISIONS UNDER RISK

11 Q: I want to ask you now about the empirical data that helps us know whether, when
12 they make decisions about risks, people appear to be acting rationally. Let's begin with
13 this question. Why do economists study risk information and risk perception?

14 A: Economists have analyzed risk information and risk beliefs for centuries. Economists'
15 initial interest was in financial risks, such as whether a stock price would go up or down and how
16 people's risk beliefs related to the functioning of financial markets. Subsequently economists
17 developed studies of nonfinancial risks, such as those pertaining to health and safety. I was
18 among the economists who began analyzing these nonfinancial risk issues in the 1970s. Much of
19 the focus then as now has been on the health and safety risks posed by jobs, products, and
20 environmental risks. Most recently, economists have added the risks of terrorism to matters that
21 can be analyzed with economic tools. A major focus of these economic analyses has been on
22 risks that are traded in markets, usually because the risks are among the attributes of the job or
23 product. Thus, if there are risks tied to a job or a product, there will be ways in which market

1 processes will deal with these risks.

2 Q: How do cigarettes fit within that analysis?

3 A: Cigarettes are the riskiest product in widespread consumer use. The potential adverse
4 health effects include death, cancer, and other highly severe consequences. Other products, such
5 as automobiles, also can pose substantial risks in terms of severe health effects. What
6 distinguishes cigarettes is the very large probability that such severe health effects may occur.

7 The result is that the risk as reflected in both the probability of various adverse health effects and
8 their severity is extraordinary compared to other consumer products. But these risks are also
9 very well known and have been for many years. Indeed, as I will document below, consumers
10 overestimate the risk of many severe potential consequences of smoking, such as lung cancer.

11 Q: Given those risks, how can it be that people rationally choose to smoke?

12 A: A consumer could rationally choose to smoke if the perceived benefits of the product
13 outweigh the perceived risks and non-health costs associated with the product, such as the
14 product price. Consumers can derive positive expected utility from smoking just as there might
15 be a rational basis for undertaking other potentially risky decisions in our daily lives. This
16 choice process involving a comparison of risks and benefits is common to almost every choice
17 we make. The public health community has been quite active during at least the past 20 years in
18 attempting to convince people that smoking must necessarily reflect irrational behavior as they
19 fail to recognize any positive benefits. As I state in my second smoking book, smoking
20 enjoyment is neither idiosyncratic nor insubstantial. Smoking was once the norm among U.S.
21 adults. Even today, empirical data on consumer smoking behaviors strongly suggest that
22 smokers continue to perceive substantial benefits from smoking and are making informed
23 decisions to smoke, given the nature of the benefits they perceive and how they trade off the

1 risks and costs of smoking against their smoking preferences.

2 Q: Briefly, what types of empirical data are you referring to?

3 A: When we examine smoking behavior within a variety of empirical domains, we see the

4 same pattern of economic rationality and rational behavior. For instance, as consumers'

5 perceptions of the health risks rose in the 1950s and 1960s, they became less willing to smoke

6 and, in fact, fewer people chose to smoke and many quit. The overwhelming majority of those

7 who continued to smoke switched to filter-tip cigarettes to reduce risks. Similarly, in the 1970s,

8 when low-tar cigarettes became available and were endorsed by public health officials as a

9 reduced risk alternative to quitting, many consumers acted consistently with a model of rational

10 behavior by choosing those products. According to numerous surveys, approximately 30% of

11 consumers identified low-tar cigarettes as presenting reduced risks, although more recent

12 estimates are approximately half that percentage, and better taste has consistently been reported

13 as the strongest basis for choosing low-tar cigarettes. The rise of light cigarettes was part of a

14 longer term trend as smokers have steadily reduced the tar levels of their cigarettes over the past

15 60 years. Consumers have also responded to changes in the financial costs of smoking. As the

16 monetary costs for cigarettes have continued to increase, consumers have acted consistently with

17 a model of rational behavior and have deliberately chosen to quit or to reduce their consumption,

18 again displaying rational behavior in ways that can be demonstrated in econometric fashion to

19 mimic consumer behavior for other goods. Specifically, as I have described in my first book on

20 smoking, the price elasticity of demand for cigarettes is -0.4 to -0.7 , meaning that a 10%

21 increase in the product price would lead to a 4-7% decrease in the quantity of cigarettes sold,

22 which is similar to a variety of consumer products. Finally, as the non-monetary, non-health

23 risks costs for smoking have increased, for instance through workplace restrictions that increase

1 the opportunity costs for smoking, smokers have responded in rational fashion with reductions in
2 smoking behavior.

3 Q: Isn't there a strong sentiment in the public health community and those who
4 advocate against smoking that cigarette smoking cannot be the product of rational choice?

5 A: I think that is a fair way of putting it. Many non-smokers have difficulty understanding
6 why people would choose to smoke in view of the profound health risks. There appear to be two
7 schools of thought based on the premise that smokers are behaving irrationally. In fact, the
8 viewpoint of each of those schools has been expressed by expert witnesses who have appeared
9 on behalf of the plaintiff in this case, Dr. Weinstein and Dr. Slovic.

10 Q: Briefly, what are the viewpoints of those schools?

11 A: The first school suggests that those who smoke would not make that choice if only they
12 had some additional information about the risks; in other words that people lack some essential
13 information about the risks that, if they had it, would change their decisions and their behavior.
14 One can reject this school's premise based on three separate and important lines of evidence.

15 First, extensive survey data demonstrate that all groups in society, smokers and non-smokers
16 alike, are robustly aware of smoking risks. People know that cigarette smoking may kill those
17 who choose to do it. In fact, people significantly overestimate the actual number. Second, there
18 is simply no basis to argue, and in fact neither Dr. Weinstein nor Dr. Slovic does, that smokers
19 and non-smokers have been exposed to different information about the risks. They all live in the
20 same basic information environment. Yet one group, a minority, has chosen to take the risk, and
21 the other, a majority, has not. Under those circumstances it is specious to suggest that
22 information, or more accurately a lack of information, could account for the difference. Third,
23 extensive tests of the hypotheses that there is an "information deficit" concerning the risks of

1 smoking have shown that providing additional information about risks has not, for at least the
2 past 20 years, significantly changed the perceived risks of smoking or smoking behavior.

3 Q: Isn't there some evidence that suggests that smokers report slightly less
4 "perception" of the risks than do non-smokers?

5 A: Yes, there is some evidence that smokers have somewhat lower risk beliefs, but the
6 differences are not stark. Moreover, this comparison should have no bearing whatsoever on an
7 assessment of whether smokers are properly informed. The pertinent comparison is how
8 smokers' risk beliefs compare to the actual risk levels, not to the risk beliefs of nonsmokers.

9 Both smokers and nonsmokers have been exposed to the same basic information about smoking,
10 and you can't reason backwards to say that the "fact" of a difference in perception demonstrates
11 a different smoking risk information environment for smokers and non-smokers.

12 Q: Why might we observe such a difference in perception?

13 A: Such a difference should be expected because smoking is an activity that is self-selected.
14 My coauthors and I have published research results which demonstrate that across a variety of
15 risk domains, smokers are willing to take more risks than non-smokers. In other words,
16 compared to non-smokers, smokers are less deterred from risky activities by the threats posed by
17 the risks. People who have lower risk beliefs or who are more willing to assume a given level of
18 health risk should be more likely to smoke, because a lower risk belief reduces the expected
19 health costs of smoking.

20 Q: Doesn't the fact that people decide to smoke show that their risk perceptions are
21 really substantially different than those of nonsmokers?

22 A: No. The undesirability of the risks posed by cigarettes will depend both on the perceived
23 probabilities of adverse health effects and also on people's willingness to bear a given risk. As I

1 point out in my second book on smoking, extensive research has demonstrated, rather
2 unsurprisingly, that smokers, as a group, are significantly more likely to take health and safety
3 risks of various kinds than nonsmokers. Smokers, in effect, place a lower weight on health risks
4 in a wide variety of situations, both at work and at home. Many of my empirical analyses have
5 documented this relationship.

6 Q: What is the second school you mentioned?

7 A: The second school concedes that smokers are informed about the risks, but asserts that
8 they do not make rational choices. Note that if in fact it is true that people are quite well
9 informed of the dangers of smoking, then additional or different information that conveys the
10 true risks of smoking will not alter smoking behavior, whether people are rational or not. Some
11 proponents of the irrationality school argue that the mere fact of smoking, in the presence of the
12 risks, importantly shows the “fact” of an irrational choice. Others have proposed “extra-rational”
13 or “non-rational” processes, such as Dr. Slovic’s “affect heuristic,” whereby rational decision
14 making is somehow overwhelmed by some emotive processes. Still others propose that the
15 addictive nature of smoking trumps rational cognitive processes, or that although smokers
16 recognize the risks to others, they engage in unrealistic optimism when it comes to believing that
17 those risks apply to them.

18 Q: Where do we stand today? Are consumers aware of the risks of smoking, and do
19 they decide rationally?

20 A: The empirical evidence demonstrates that they do decide rationally. And smokers
21 actually overestimate the level of risk associated with smoking. This evidence of risk
22 overestimation is demonstrated for three major categories of smoking risk: lung cancer, total
23 smoking mortality, and life expectancy loss. For each of these risks, smokers actually believe

1 that the risks are greater than prevailing scientific estimates of those risks.

2 **IV. EMPIRICAL DATA ON SMOKING RISK BELIEFS**

3 Q: How does one go about determining if people over or underestimate the risks of
4 smoking?

5 A: There are really only two pieces to the puzzle. First, you need to know the actual risk.
6 Second, you need to know the level at which smokers perceive the risk. The appropriate time
7 component in making the measurement is to compare the state of scientific knowledge at the
8 time the risk beliefs are elicited. And because we know that everyone lives in the same basic
9 information environment, and that smoking is a self-selected activity which carries with it a
10 different valuation of risks, whether *nonsmokers* have higher risk beliefs does not answer
11 whether *smokers*' risk beliefs are too high or too low compared to the actual product risks.

12 Q: Is this an approach you developed for this case or for tobacco litigation in general?

13 A: The standard approach in the economic literature on risk taking is to compare subjective
14 risk beliefs to objective risk levels to determine whether perceptions are biased. This
15 methodology has been well established quite independently of any investigation of smoking
16 behavior. The approach was first employed in the tobacco context in my article, *Do Smokers*
17 *Underestimate Risks?*, JOURNAL OF POLITICAL ECONOMY (1990), (JE-060512) and in my book,
18 SMOKING: MAKING THE RISKY DECISION. JD-004648.

19 Q: Which risks of smoking did you use to compare people's perception of the risks to
20 the actual risks?

21 A: I examined the data for three especially salient risks. First, I examined people's beliefs
22 regarding the lung cancer risks of smoking. I then extended the measures in two ways, by
23 analyzing perceptions of the total mortality risk of smoking and assessing whether people

1 understood the life expectancy loss associated with smoking.

2 Q: Lets talk about the scientific estimates of the actual risk of smoking, first. Can you
3 tell us how you determined those?

4 A: There are a variety of risk estimates that government and public health agencies have
5 formulated over time. I have focused on comparisons using the Surgeon General's estimates and
6 estimates from the National Cancer Institute. For instance, for lung cancer, calculations based on
7 those estimates indicate that 6 to 13 smokers out of 100 will develop lung cancer, with a mid-
8 point of that estimate of about 10 per 100. Of course any estimate is based on certain
9 assumptions, such as the amount of average daily smoking and the number of years of smoking,
10 and there has been some fluctuation in those values over time. There have also been a variety of
11 criticisms directed to the Surgeon General's estimates of the mortality attributable to smoking.
12 Many of these criticisms, based on more recent studies by researchers at Johns Hopkins and the
13 National Cancer Institute, have questioned whether the people comprising the sample data that
14 were used to estimate these risks were appropriately representative of the population at large.
15 After adjusting for such sample composition effects, some researchers have concluded that the
16 earlier risk estimates by the Surgeon General were too high. However, since the upwardly
17 biased estimates of the risk reflected the state of scientific knowledge around the time of the
18 surveys, I used them as my scientific reference point for the actual risk of smoking.

19 Q: What is the approximate risk of dying from any disease because of smoking that has
20 been estimated by public health agencies?

21 A: A Using estimates based on reports and press releases by the U.S. Surgeon General
22 puts the number, out of a hundred smokers, at somewhere between 18 to 36 out of 100.

23 Q: Has the Surgeon General also given estimates for lost life expectancy as a result of

1 smoking?

2 A: Yes, you can use information from the Surgeon General's reports to calculate that as
3 well, and the life expectancy loss from smoking is approximately 3.6 to 7.2 years. Another
4 recent estimate by the Surgeon General is 6.6 years, which is also within the earlier range.

5 Q: After determining the actual risks of smoking, what is the next step?

6 A: The next step is to determine how risky people perceive smoking to be. To do that we
7 use answers to survey questions that elicit information about risk beliefs in a way that allows
8 comparisons to the actual or scientifically estimated risks. To make this type of comparison, and
9 determine if people perceive the risks to be above, below, or about the same as the scientific
10 estimates, you must elicit quantitative responses.

11 Q: What surveys did you use?

12 A: I used four surveys, and they are as follows: a September 1985 "A Survey About
13 Smoking" by Audits and Surveys, Inc. (JD-022818); a 1991 North Carolina Survey that I
14 conducted and is reported in SMOKING: MAKING THE RISKY DECISION (JD-004648) and in
15 articles I have published; a February 1997 "Attitudes Toward Cigarette Smoking" by Audits and
16 Surveys Worldwide (JD-022820); and a December 1998 Roper Starch Survey entitled "An
17 Assessment of Risky Behaviors in Massachusetts." (JD-023083).

18 Q: In general, how did these surveys ask people about their perceptions of the risks of
19 smoking?

20 A: The surveys ask respondents about their estimates of lung cancer and total smoking
21 mortality in terms of the number "out of 100 smokers" or "among 100 cigarette smokers." The
22 life expectancy loss question has been run in several different ways, each of which can be used to
23 elicit an expected years of life expectancy that are lost.

1 Q: Before we get into the details of those surveys, would you tell us how you became
2 acquainted with the concept of asking people to provide quantitative estimates of smoking
3 risks?

4 A: Around 1986 or 1987, I received a call from a lawyer at Jones Day who asked if I would
5 be interested in sharing my expertise on hazard warnings with them. By that time, I had written
6 3 books on occupational risks and warnings, worked extensively on chemical warnings and with
7 the EPA on warnings, and had run a survey on how smokers engaged in risk taking in the labor
8 market. At one of the meetings I had with the Jones Day attorneys, I was shown several file
9 drawers full of articles on hazard warnings, and asked to take a look at them. One of the items I
10 found was a survey by a research firm called Audits & Surveys Worldwide. JD-022818. What
11 struck me when I looked at the 1985 survey was the fact that the methodology used made it
12 possible to make an objective assessment of the risk beliefs. The objective, quantitative
13 character of response sought by the survey instrument was unlike any other surveys of smoking
14 risk belief I had seen, and as an economist I believed it had the potential for providing an
15 important new dimension in our understanding of consumers' perceptions of the risks of
16 smoking. I requested a copy of the survey and the underlying data, so I could evaluate it myself.

17 Q: At the time, did you have any questions about the validity of the data generated by
18 the survey?

19 A: From its face, it was apparent that the 1985 survey had been commissioned by a number
20 of law firms and was, according to the first page, "In Anticipation of Litigation." But the survey
21 itself had been conducted by a reputable international survey firm based in New York, Audits &
22 Surveys, Inc. It is a well respected firm that is relied on by businesses and governments
23 throughout the world. When I first saw the survey, I carefully reviewed the text of the survey to

1 determine whether the survey had face validity. I determined that the questions were
2 meaningful, and that there were no apparent biases engendered by the survey structure or the
3 question wording.

4 Q: Were you provided with the materials you requested?

5 A: Not only did I get the survey text and the report on it, but I discussed the details of the
6 survey with the Audits & Surveys people, obtained the data directly from them, and then
7 analyzed the survey questions and the data myself.

8 Q: Were you paid by the industry for any of this verification work?

9 A: Yes, I was paid for an initial verification of the survey results. However, I then asked if I
10 could use the survey for my own research purposes. I was told I could, and that research was a
11 “no strings attached” arrangement, for which I received no compensation. At no time did anyone
12 attempt to exert any control over my research or my work or place any limits on what I did or
13 what I wrote. In fact, while my analyses were consistent with the original results, I believed that
14 it would be important to try to replicate the results in order to test the validity of the findings
15 from this first survey. So, in 1990 and 1991, I performed my own survey in North Carolina,
16 while I was on the faculty at Duke University. In that survey, I included not only the relevant
17 questions from the 1985 survey, but I also framed the questions in alternative ways to test
18 whether the responses were sensitive to the particular language of the question. My 1991 survey
19 was undertaken without any industry knowledge or support. Also, I added additional questions
20 extending the scope of my survey to measures of risk not explored in the 1985 study.

21 Ultimately, I reported the results of all of this work in my first book on smoking risks, SMOKING:
22 MAKING THE RISKY DECISION. JD-004648.

23 Q: Q: What were the methods and results of the 1991 survey?

1 A: First, I determined that the basic survey approach of asking people what the lung cancer
2 risk was out of 100 smokers was a natural way for people to think about the risk. Posing the risk
3 question in terms of a population denominator was also consistent with the approach I had taken
4 in my work for EPA. Second, I explored the sensitivity of the lung cancer question to a variation
5 in the question in which people would die from lung cancer and not simply contract lung cancer.
6 The risk beliefs I obtained were quite high and consistent with the 1985 results. Third, I
7 examined whether people over-perceived the overall mortality risks of smoking, not simply the
8 lung cancer mortality risk. These results likewise indicated risk overestimation. Fourth, I
9 examined whether people properly assessed the extent of life that was at risk due to smoking.
10 The life expectancy loss question also yielded results indicating risk overestimation. Finally,
11 since I was responsible for administering the survey rather than a survey research firm, I
12 examined the consistency of the results in light of the results, methods, and question wordings of
13 the 1985 survey, which had been administered by Audits & Surveys. I determined that the
14 results were not sensitive to the survey organization or question wording.

15 Q: Did the tobacco industry fund the writing of your 1991 book?

16 A: No. Neither the tobacco industry, nor any of the law firms representing the industry,
17 have ever funded any of my articles or books. Nor did they attempt to exercise any editorial
18 control over any of these publications.

19 Q: You told us about the 1985 and 1991 surveys, could you please describe the 1997
20 and 1998 surveys and the results?

21 A: I was not involved in conducting the 1997 survey, although it did integrate questions
22 from my 1991 survey. The 1997 survey was run by Audits and Surveys Worldwide, and it is my
23 understanding that this survey was paid for by the tobacco industry. In 1998, I directed a

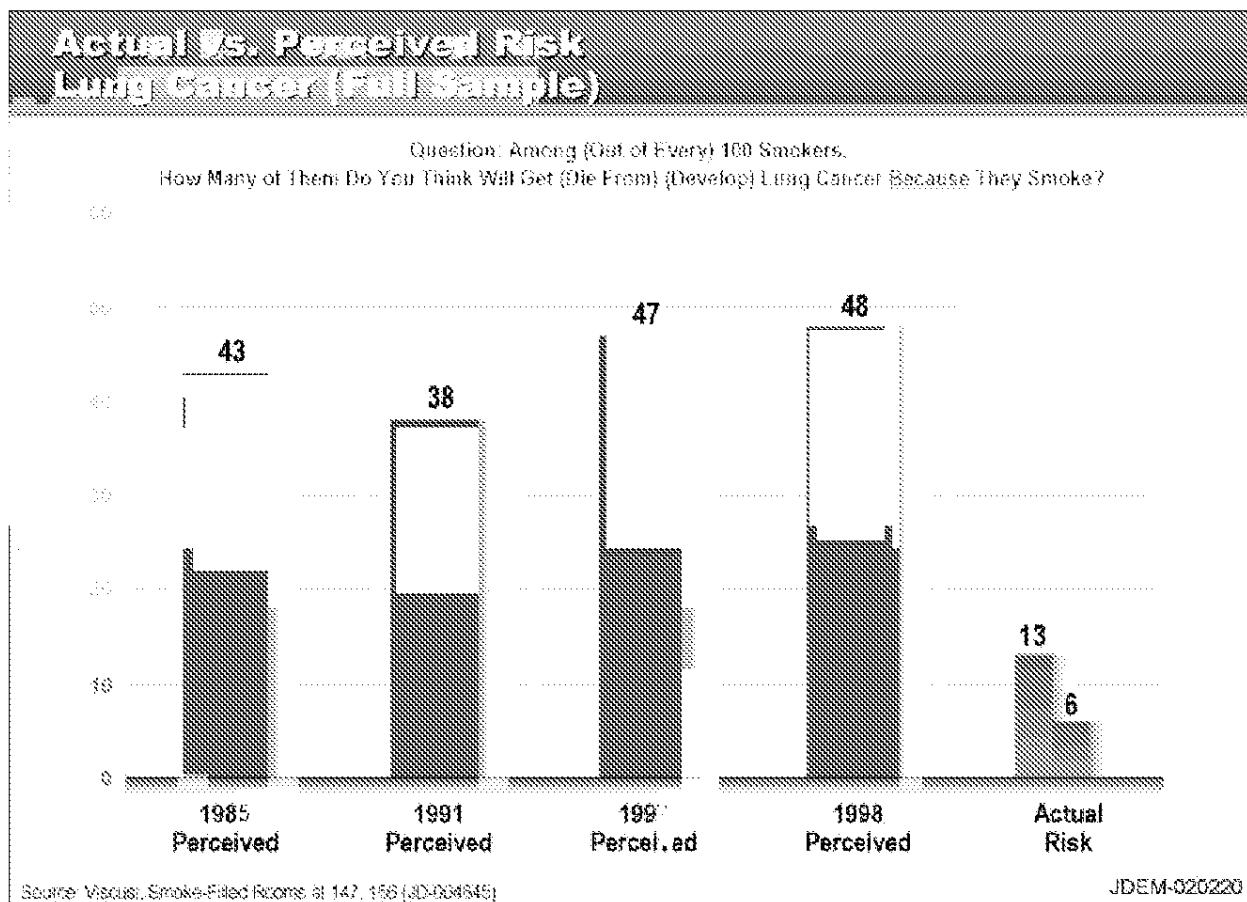
1 modified implementation of the earlier smoking surveys, which was administered by the firm
2 Roper and Starch. That survey was funded by the industry, and was designed to gather data from
3 a Massachusetts population in connection with that state's lawsuit against the industry. The
4 results of those surveys were also published and ended up, along with findings from the original
5 two surveys, in my second book about smoking, SMOKE-FILLED ROOMS. JD-004645.

6 Q: In your opinion, do these surveys provide valid and reliable data in terms of
7 assessing consumer perceptions of smoking risks?

8 A: Yes. I've published the results of these surveys in many of the top peer reviewed
9 economic journals, and they have appeared in several of my books, all of which were peer-
10 reviewed. Thus the data from these surveys have been reported in the scientific literature for
11 years, along with the survey questionnaires. As I will point out later, other investigators have
12 employed similar questions and reported similar results. These additional surveys not only
13 confirm the direction, magnitude, and consistency of my results, many show even higher levels
14 of risk perception than the data that I have reported.

15 Q: Let's get back to what was found in your initial set of surveys. First have you
16 prepared a chart demonstrating your findings on lung cancer?

17 A: Yes, I have. It is presented on the next page as JDEM-020220.



1 Q: Would you describe what this chart illustrates?

2 A: Let's take these one at a time. All of these questions are of the general form, out of 100

3 smokers, how many do you think will get lung cancer or die from lung cancer because they

4 smoke. The first bar for 1985, indicates that in the 1985 national survey, on average people

5 smoke. The second bar for 1991, is my North Carolina survey. In that survey, which was a rather small, local

6 sample, the average of responses reflected the belief that 38 out of 100 smokers would die from

7 lung cancer because they smoke. JD-004645. The 1997 survey was a larger national survey.

8 The average risk belief demonstrated in the results of that survey was that 47 out of 100 smokers

9 would get lung cancer because they smoke. JD-004645 Finally, the 1998 survey was the survey

10

11

1 undertaken in Massachusetts. It was not, however, a random sample of Massachusetts residents,
2 because Medicaid recipients were oversampled. In that survey, the average estimate was that 48
3 out of 100 smokers would die from lung cancer due to their smoking. JD-004645.

4 Q: What is the last column on the right in the chart?

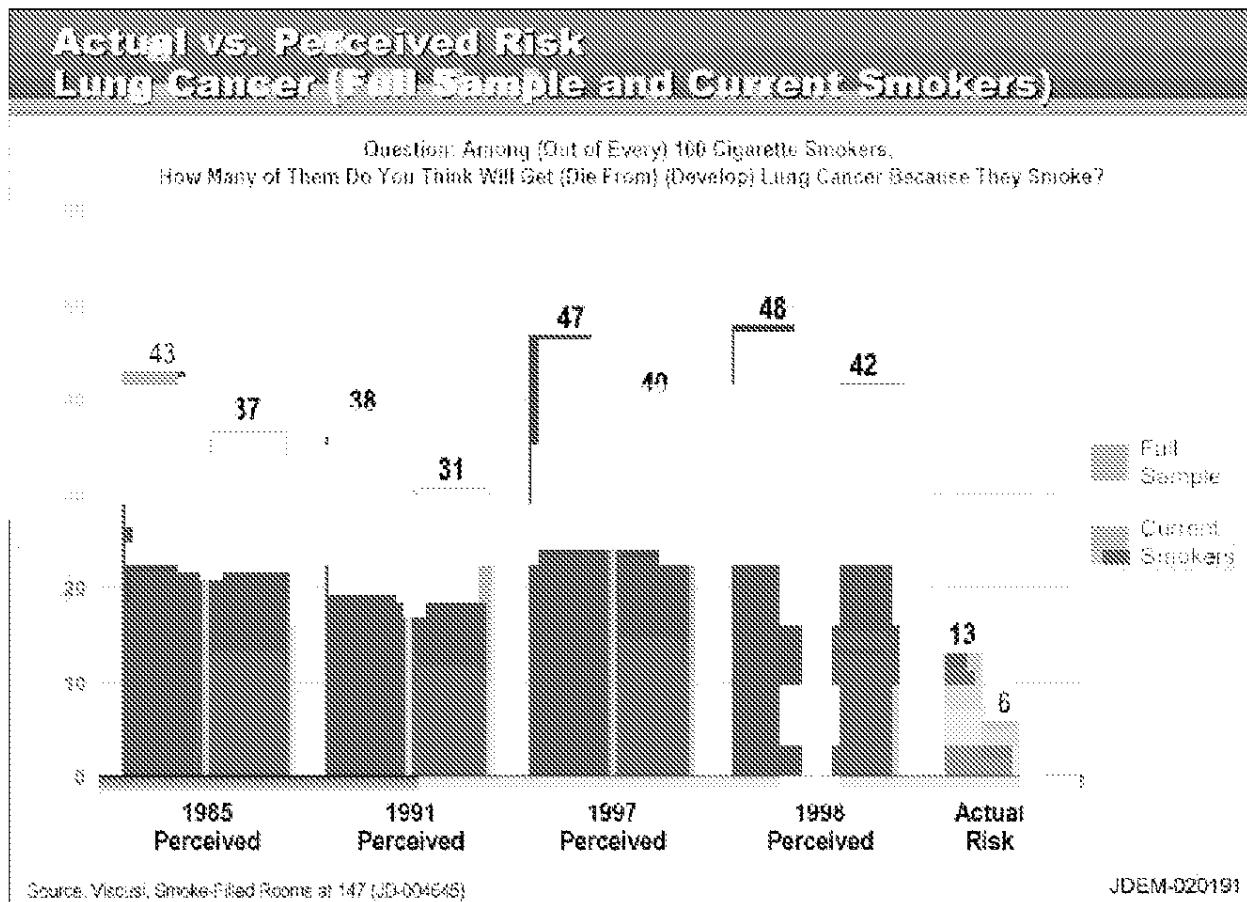
5 A: The last column is the actual risk estimate from public health authorities, 6 to 13%, with
6 the approximate midpoint at 10%. What the chart shows overall is that in contrast to the actual
7 lung cancer fatality risk from smoking of about 10%, people express the belief that the risk is
8 from 38% to 48%, and are overestimating the risk of lung cancer due to cigarettes by a factor of
9 about four to five.

10 Q: Earlier you mentioned that the results from the four studies you primarily rely on
11 were confirmed by others. How have your results concerning people's perceptions of the
12 risk of lung cancer been confirmed by others?

13 A: For example, in the 1999 Annenberg-I Survey, respondents aged 14-22 were asked a
14 very similar question to the one I had asked. That question, Q1a, reads, "Now I would like you
15 to think about people who smoke cigarettes. Out of every 100 cigarette smokers, how many do
16 you think will [get lung cancer because they smoke]?" JD-020489. The results show a mean
17 response of about 56 out of 100. JD-025171. About 70% of the respondents put the number
18 above 30 out of 100. JD-020489. Similarly, in the Weinstein, Slovic (2001) survey, teen and
19 adult smokers were asked "Out of 100 people who smoke half a pack a day, how many do you
20 think will eventually develop a life-threatening illness from their smoking?" The mean results
21 were 61 for adult non-smokers, 50 for adult smokers, 66 for teen non-smokers and 56 for teen
22 smokers. JD-025084, Q9.

23 Q: In the chart you present above, you show the risk perception of the full sample

1 surveyed. Did you also examine how smokers' estimates may differ from non-smokers?
2 A: Yes, as you can see in the chart below, smokers tend to estimate the risk a few points
3 below non-smokers. However, as this chart shows, smokers' estimates and risk beliefs are still
4 quite similar to non-smokers, and are still well above the actual risk (JDEM-020191).



5
6 Q: Why do smokers express slightly lower risk beliefs than non-smokers?
7 A: As I mentioned before, it isn't because they know less about the risks. Smokers are a
8 self-selected group with different, and lower, overall risk beliefs. Their willingness to bear
9 health and safety risks of all kinds is greater than that of non-smokers.
10 Q: Is the overestimation of risk reflected in these surveys statistically significant?
11 A: Yes, I calculated the confidence intervals and the lower end of the confidence intervals

1 are above the “true” risk as estimated by the Surgeon General.

2 Q: Both Dr. Weinstein and Dr. Slovic have suggested that questions which ask for
3 quantitative estimates of smoking risk do not yield reliable data concerning people’s beliefs
4 about the health risks of smoking. Are you aware of their criticisms?

5 A: Yes, and I don’t believe those criticisms are valid.

6 Q: Why not?

7 A: First, thinking in terms of a risk to some population is a natural way for people to
8 conceptualize probabilities. We have validated this general approach in a series of studies for
9 EPA, as have other researchers. Second, if, as Drs. Weinstein and Slovic suggest, people are
10 incapable of thinking about or estimating adverse outcomes in terms of numbers of smokers out
11 of 100, or are simply making an uninformed guess, then the pattern of results should itself be
12 random. You would expect to see inconsistent results from survey to survey. But instead, the
13 estimates people give do cohere, and they are stable across various survey designs and question
14 wordings. In fact, Dr. Weinstein agreed that whenever he has seen the lung cancer question
15 posed in this manner, the average response has consistently been in the range of about 40 to
16 60%. 2/14/05 Tr. Tran. at 13194.

17 Q: What about in Annenberg-II, when two lung cancer questions were asked, first in
18 Question 1A and again in Question 3, and the estimate was lower in response to the second
19 question. Doesn’t that argue against the validity of the 40-60 range?

20 A: Not in the least. What occurred is really very interesting. The question that was first
21 asked in Question 1A was “I would like you to imagine 100 cigarette smokers, both men and
22 women, who smoked cigarettes their entire adult lives. How many of these people do you think
23 will die of lung cancer?” People gave what we now know are typical probability estimates in

1 response, with a median of about 55 out of 100. Consistent with other surveys, younger
2 respondents believed the risk was higher than adults. Then, two questions later, people were
3 asked to “think again” about their earlier response, implying that their previous answer was not
4 satisfactory. The survey instructed respondents that “all of these smokers will eventually die of
5 something,” and were told to “consider the following 5 possible causes of death: automobile
6 accidents, heart disease, stroke, lung cancer, and all other causes combined.” The survey was
7 designed so that the first three responses for which an estimate was requested were automobile
8 accidents, heart disease, and stroke. These were randomized. In contrast, the survey always held
9 lung cancer in the fourth position. Anyone with passing familiarity of the science of survey
10 design would understand this structure would deliberately bias downward the lung cancer
11 response.

12 Q: Why would that form of survey structure bias the lung cancer response in a
13 downward direction?

14 A: Because of a well known bias called response order effect. And in fact the results show
15 that is exactly what happened. The data in Annenberg-II demonstrate that the order of questions
16 biased the result in exactly the fashion predicted by response order effect. To test for the order
17 effect I analyzed the answers people gave for automobile accidents, heart disease, and stroke,
18 depending on whether these ailments were listed first, second, or third. The higher the
19 randomized proposed answer for these causes of death was put in the list, the greater the
20 percentage people assigned to it. In addition, because the total number of deaths cited could not
21 exceed 100, many respondents had used up the 100 possible deaths by the time they got to the
22 lung cancer option. The interviewers kept a running tally of the responses. In some instances,
23 the respondents never got to the lung cancer option before using up the 100 deaths. A more

1 common result is that the respondent hit the 100 death constraint while answering the lung
2 cancer question, thus limiting the total number of deaths that could be allocated to lung cancer,
3 which was always kept in the fourth position. Particularly in a long telephone survey where
4 respondents were not prepared to engage in a pencil and paper exercise, one would expect that
5 people might have difficulty in doing the mental accounting needed to keep track of the series of
6 risk estimates and their running total.

7 Q: How then are the results to Question 3 to be interpreted?

8 A: Even when the survey structure biased the lung cancer estimate downward, people still
9 provided estimates of the risk of lung cancer that were significantly above the “true” risk
10 estimate from the Surgeon General. The mean response was about 26 out of 100. Given the
11 effort in the survey design to drive down the lung cancer response, it is remarkable that the
12 survey still demonstrates a significant overestimate of the risk. Second, and perhaps even more
13 importantly, when people adjusted their lung cancer estimate downward because of how the
14 question was structured, the smoking mortality risk estimate that was “taken away” from lung
15 cancer was put into other smoking related diseases. So, the net change was clearly not that
16 people made a lesser estimate of overall smoking mortality risk. Instead, people’s estimates of
17 overall smoking mortality from smoking-caused heart disease, stroke, and lung cancer increased
18 when, in response to the closed-ended format of Question 3, they made a different partitioning of
19 the diseases that the “100 smokers” would eventually die from because of their smoking.
20 Shifting people’s stated risk beliefs from lung cancer to other smoking-related diseases, such as
21 heart disease and stroke, does not imply that people consider smoking to be safer than if smokers
22 were going to die of lung cancer instead.

23 Q: Let’s now discuss people’s perceptions of the total mortality risk from smoking.

1 When did you first begin to investigate that?

2 A: In my 1991 survey. I wanted to investigate whether people's overestimation of lung

3 cancer risk was unique to that disease, or whether it was part of a broader phenomenon of

4 smoking risk overestimation. Because lung cancer was the first smoking risk to be highly

5 publicized, I wanted to test the hypothesis that people might only overestimate that risk, but not

6 some broader measure. So, for the 1991 survey, I devised the following question: "Among 100

7 smokers, how many of them do you think will die from lung cancer, heart disease, throat cancer,

8 and all other illnesses because they smoke?" JD-004648. That question also appeared in the

9 1997 survey, and I wrote a slightly different version for the 1998 survey. The change in the 1998

10 survey involved replacing the first word of the question "Among" with the phrase "And out of

11 every".

12 Q: What did you find?

13 A: As shown in the table below, my 1991 North Carolina survey yielded an average estimate

14 that 54% of smokers would die from an illness caused by their smoking. JD-004648. In the

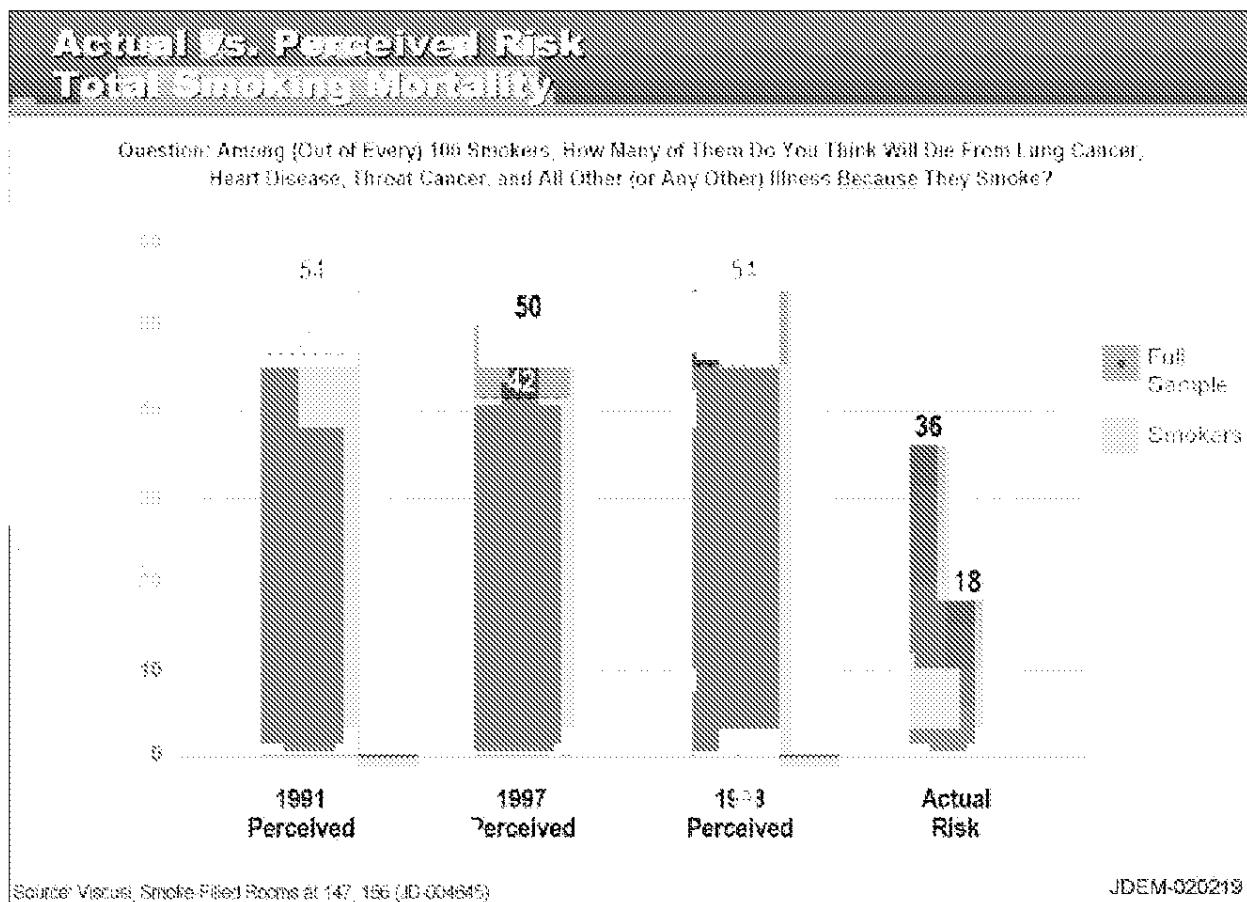
15 1997 national survey, the mean estimate of smoking caused death was 50%. JD-004648. And in

16 the 1998 Massachusetts survey, the mean was 54%. JD-004645. The last bar on the chart shows

17 the proposed "scientifically accurate" risk range we discussed earlier, 18% to 36%. As you can

18 see, people believe that the total smoking mortality risk is roughly double the estimated actual

19 risk of dying from smoking.



1 Source: Viscusi, Smoke-Filled Rooms at 147, 186 (JD-034848).

JDEM-020219

2 Q: Have there been other surveys that have reported similar results?

3 A: Yes, but the questions have sometimes been a bit different. For instance, the Weinstein,
 4 Slovic (2001) survey we discussed earlier asked a somewhat similar question. Question 9,
 5 asked "Out of 100 people who smoke half a pack of cigarettes a day, how many do you think
 6 will eventually develop a life threatening illness from their smoking?" JD-025084. The results
 7 are not precisely comparable to the questions I asked, because the Weinstein and Slovic survey
 8 asks about the risk for a person who smokes $\frac{1}{2}$ pack per day, and the outcome risk is posed in
 9 terms of developing a "life threatening" illness, rather than actually dying. However, their
 10 wording of the question yields a similar result that is consistent with my findings. The mean
 11 responses for their question, JD-025084, are in the table below:

	Adult	15-19
Smoker	50	56
Non - Smoker	61	66

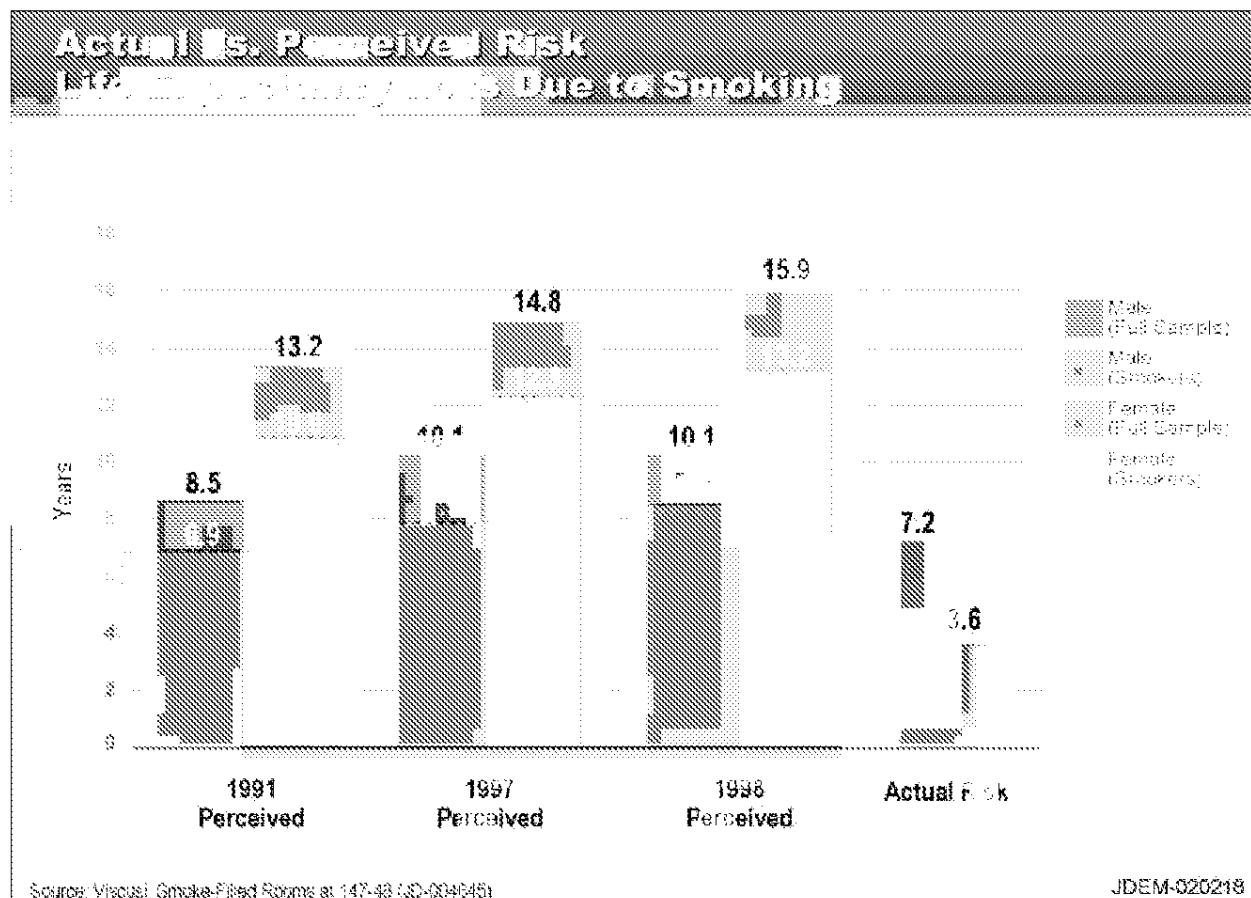
1

2 Q: Did smokers' mortality risk estimates and beliefs differ from non-smokers?

3 A: Yes. The results are similar for all three mortality risk belief surveys that I have
4 analyzed, and smokers believed that the overall risk of dying from smoking was a few
5 percentage points below where nonsmokers estimated the risk. But as before, smokers
6 significantly overestimated the "true" smoking caused mortality risk.

7 Q: Have you prepared another chart that compares public perception to biostatistical
8 reality on the subject of how many years of life smokers give up because they smoke?

9 A: Yes. Again, this was not a question posed in the 1985 survey, but one I developed in
10 1991 as a further test of smokers' risk beliefs. In addition to determining smokers' estimates of
11 the probability of death caused by smoking, I wanted to estimate how much life expectancy
12 people believed they would be giving up from smoking. For example, if a nonsmoking woman
13 expects to live to age 80, what would she think the life expectancy of a smoker would be. Would
14 it be 75? Would it be 79? Would it be 60? So, I developed the following question in 1991:
15 "The average life expectancy for a 21-year-old male (female) is that he (she) would live another
16 53 (59) years. What do you believe the life expectancy is for the average male (female)
17 smoker?" JD-004645. This question was asked with modifications in the 1997 and 1998
18 surveys. JD-004645. The table below, JDEM-020218, presents the results.



Source: Viscous, Smoke-Filled Rooms 81:147-48 (SD-004645).

JDEM-020219

2 Q: What is your interpretation of these results?

3 A: As you can see, in the 1991 North Carolina survey, men believed they would lose 8.5

4 years of life and women believed they would lose 13.2 years. JD-004645. For 1997, the

5 estimates from a national sample were 10.1 years of life lost for women, and 14.8 years of life

6 lost for men. JD-004645. In 1998, the Massachusetts estimates were 10.1 years of life lost for

7 men, and 15.9 years of life lost for women. JD-004645. If you restrict to the responses given by

8 smokers, the comparable numbers are for 1991 (6.9/10.9), for 1997 (7.9/12.3), and for 1998

9 (8.6/13.2). JD-004645.

10 Q: How do those estimates compare to the actual risks?

11 A: For the full sample, the perceived loss of life expectancy exceeds the “true” value of 3.6

1 to 7.2 years by a wide margin. These scientific reference points for the “true” risk are for all
2 smokers as a group, and are not disaggregated by gender. If you restrict the comparison to
3 smokers, the perceived loss of life becomes nearly accurate, but still exceeds the “true” risk.

4 Q: In this chart and in earlier ones, the perceived risks tend to be lowest in your 1991
5 survey and highest in the 1998 survey. How do you account for that?

6 A: There are probably several factors at work. First, the responses are mean estimates for
7 samples in three surveys. Each sample estimate necessarily reflects some sampling error, and the
8 smaller the sample, the larger the range of error. The North Carolina sample was considerably
9 smaller than the other surveys. Second, the survey results reflect the beliefs of the population
10 being sampled. The 1991 survey was conducted entirely within North Carolina, which is the
11 leading tobacco-producing state. One might reasonably anticipate that the perceived risks of
12 smoking could be lower in that sample than in the U.S. population generally. In contrast, the
13 1998 survey focuses only on the state of Massachusetts, which, again, may not be perfectly
14 representative of the U.S. population, particularly since Medicaid recipients were oversampled in
15 that survey. Third, the question wording was changed between 1991 and 1997-98, and that may
16 have influenced the results. Before asking for the estimate of lost life expectancy, the 1991
17 question told the person being surveyed that “The average life expectancy for a 21 year-old-male
18 (female) is that he (she) would live another 53 (59) years.” The 1997 and 1998 surveys told the
19 survey participant that “an average 21-year-old male (female) would be expected to live to the
20 age of 73 (80).” JD-004645.

21 Q: Have you studied the effect of educational level on perceived risks of smoking?

22 A: Yes, and I have published on that topic as well.

23 Q: Is a person’s level of education an important predictor of his or her perception of

1 the risks of smoking?

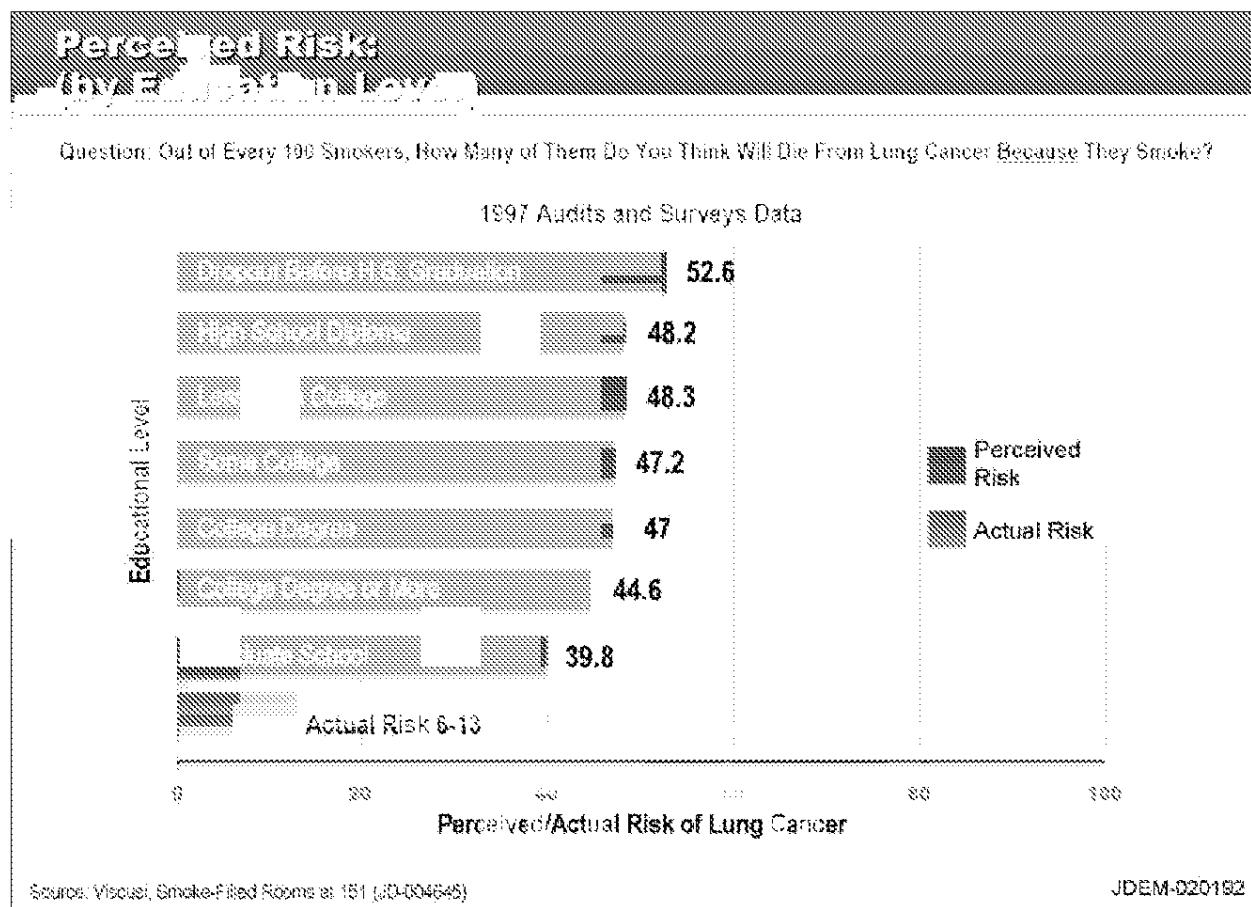
2 A: No. People clearly do not need a college education to understand that smoking is risky.

3 In fact, the answers to the risk perception questions for people that have not finished high school

4 are essentially equivalent to those who are college educated. By some measures, as shown in

5 the figure below, JDEM-020192, the perception of risk actually drops slightly with increasing

6 levels of education.



7 Q: Based on your own research and the published literature, is it fair to say that people

8 over perceive the risks of smoking, regardless of their educational background?

9 A: Yes, risk perception does not vary much with education. Essentially, all segments of

10 society think smoking is risky, regardless of how many years of education they have received.

1 Q: What about age, have you studied the relationship between age and perceptions of
2 smoking risks?

3 A: Yes, I have, both in gathering my own data, and in analyzing the results of other data.
4 My analysis of the 1985 national survey included examination of lung cancer risk beliefs of
5 respondents below the age of 18. In that survey, those aged 16 to 21 significantly overestimate
6 lung cancer risks, by a larger margin than do adults 22 years of age and older (49 of 100
7 compared to 42 of 100 respectively). JD-022818.

8 Q: Are you aware of Dr. Weinstein's testimony regarding the risk perceptions of
9 adolescent smokers as compared to those of adult smokers?

10 A: Yes. On page 28 of his written direct testimony, Dr. Weinstein states: "Adolescents also
11 tend to give lower estimates for the riskiness of smoking in general, than do older people."

12 Q: What does Dr. Weinstein rely on in support of that opinion?

13 A: He cites only one source, a 1995 paper by Cohn et al. published in *HEALTH PSYCHOLOGY*,
14 *Risk-Perception: Differences Between Adolescents and Adults*.

15 Q: Does that paper support Dr. Weinstein's opinion?

16 A: No, it doesn't.

17 Q: Why not?

18 A: It did not study a situation that is relevant. The authors asked a group of parents how
19 risky they thought certain activities would be *for their kids*. In order to make the comparison, the
20 kids rated the risks to themselves for those same activities. Thus, the study looked at two
21 perspectives of the risk to the child, one from the parent, one from the child. Unsurprisingly,
22 parents believed smoking was riskier for their kids than the kids did. In fact, the authors found
23 even larger differences in how parents viewed the risk to their kids in not using seat belts, getting

1 drunk at a party, using diet pills and sniffing glue. But the authors never made the comparison
2 Dr. Weinstein appears to suggest: how adolescents view the risk to themselves, versus how
3 adults view the risk to themselves.

4 Q: Are there empirical data that are on point?

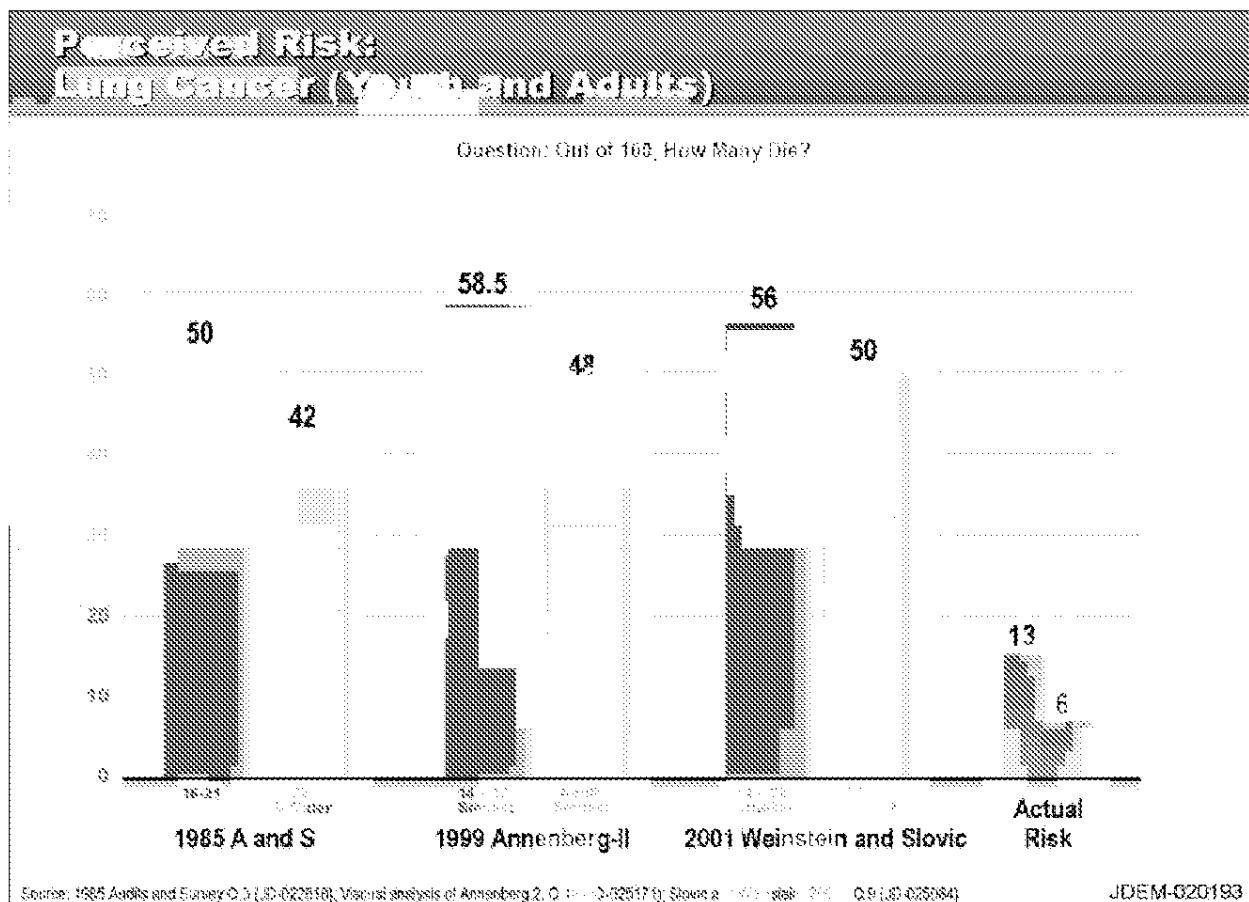
5 A: Yes, there are.

6 Q: Do they support Dr. Weinstein's testimony?

7 A: No. In fact, the empirical data strongly contradict Dr. Weinstein's testimony. The results
8 of several survey questions show that youth perceive smoking as being riskier than adults do.

9 Q: Could you provide some examples?

10 A: Sure. In fact, Dr. Weinstein and Dr. Slovic both cited some of the same data in their
11 written direct testimony. For example, on page 50 of his written direct testimony, Dr. Slovic
12 points to Annenberg-II data showing that, when asked "imagine 100 cigarette smokers, both men
13 and women, who smoked cigarettes their entire adult lives. How many of these 100 people do
14 you think will die from lung cancer?" As Dr. Slovic acknowledges, in response to that question,
15 14 to 22 year olds estimated a higher risk than adults. Slovic Written Direct at 50. The mean
16 estimate from 14 to 22 year olds was 60.4% and for adults it was 48.5%. Dr. Weinstein cites this
17 same data on page 36 of his written direct testimony. The chart on the next page, JDEM-020193,
18 illustrates some of these findings.



Source: 1985 Addis and Slovic Q.3 (JD-022518); Visual analysis of Annenberg 2, Q.4 (JD-025085); Slovic & Roy (1999) Q9 (JD-025084)

JD-DEM-020193

1 Q: Are there other examples in which younger respondents said smoking was riskier
 2 adults?

3 A: Yes. Again, in the Annenberg-II survey, Question 4-1 asked youth and adult smokers:
 4 “How risky is your smoking everyday?” and the answer choices were: “very risky,” “somewhat
 5 risky,” “a little risky,” and “not at all risky.” JD-025085. In response, 71% of the 14 to 22 year
 6 old smokers said “very risky,” while only 53% of the adult smokers chose that answer. JD-
 7 025085.

8 Q: Are there other illustrative examples?

9 A: Yes. In the Weinstein, Slovic (2001) survey, Question 9 asked 15 to 19 year olds and
 10 adult smokers: “Out of 100 people who smoke half a pack of cigarettes a day, how many do you

1 think will eventually develop a life threatening illness from their smoking?" JD-025084. The
2 mean answer for the teen smokers was 56, and the mean answer for adults smokers was 50. JD-
3 025084. There are also a number of other examples from Annenberg-I and II. I have included
4 some illustrations in the table below. Each item compares younger respondents to older
5 respondents in the same survey. Because Annenberg-I only studied a group of 14-22 year olds, I
6 have separated those responses into two age groups. For Annenberg-II, I have compared the 14-
7 22 year old group to the adult group. For simplicity and ease of presentation, some questions
8 have been slightly paraphrased. I have only included responses for "smokers," but the analysis
9 yields the same basic age-related findings among non-smokers.

Annenberg I	14-17 years	18-22 years	Exhibit No.
Q1b. Out of 100 smokers how many will have heart problems, like a heart attack, because they smoke?	53	46	JD-025171
Q1c. Out of 100 smokers how many will die from a smoking-related disease?	53	48	JD-025171
Q4b. Smoking everyday is very risky.	70	64	JD-025171
Q14. Once someone is smoking 2 or more packs/week, it is hard, very difficult or almost impossible to quit.	94	91	JD- 025171
Annenberg 2	14-22	Adult	Exhibit No.
Q3a. Smoking is very or somewhat risky to your health.	84	80	JD-025085
Q4a. Your smoking every day would be very or somewhat risky.	94	86	JD-025085
Q6a. Your smoking a pack a day increases your chance of lung cancer	57	41	JD-025085

by a factor of 10 or more.			
Q7a. Your smoking a pack a day shortens your life by 15 or more years.	32	24	JD-025085

1
2 Q: Does every response in Annenberg-I and II point to increased perception of risk and
3 difficulty of quitting, comparing youths of different ages, or comparing youths with adults?
4 A: No. Occasionally adults express a similar or slightly higher risk or addiction belief. But
5 looking at the responses as a whole, risk perceptions, including beliefs about health effects, the
6 addictiveness of smoking, the difficulty of quitting, and the harmfulness of small amounts of
7 smoking, are higher among younger people than adults. In short, the data fully support Dr.
8 Weinstein's deposition testimony that the Annenberg-I, Annenberg-II and Weinstein, Slovic
9 (2001) data *do not* show lower risk estimates among adolescents compared to adults. 2/14/04 Tr.
10 Tran. at 13207-10. They do not support his contrary assertion at trial that adolescents tend to
11 provide lower estimates of the risk than adults.

12 Q: Have you reviewed Dr. Slovic's testimony regarding youth perceptions of the
13 harmfulness of just a little bit of smoking?

14 A: I have. On page 17 of his written direct testimony he states: "Yet, when young people
15 begin to smoke they tend to believe that they can smoke for some amount of time before the risks
16 associated with smoking have any impact on them."

17 Q: Do you agree with Dr. Slovic?

18 A: No. In my opinion, the empirical data strongly refute his statement.

19 Q: What data are you referring to, specifically?

20 A: In the Annenberg-I survey, Question 12 asked youth whether they agreed with the
21 statement: "People your age who smoke can damage their lungs by smoking for just a few

1 years." In response, among 14 to 22 year olds, 84% of smokers and 93% of nonsmokers agreed.
2 JD-020489. Similarly, in Question 6d of the Weinstein, Slovic (2001) survey, 15 to 19 year olds
3 were asked whether they agreed that "[i]t is safe if you only smoke one or two cigarettes a day."
4 92% disagreed, and 73% disagreed strongly. JD-025084. In the same survey, 92% of 15 to 19
5 year olds disagreed (75% strongly) with the statement: "It is safe if you only smoke during high
6 school or college then quit." JD-025084. Question 5(1) of Dr. Slovic's Annenberg II data shows
7 that among 14 to 17 year olds, 74% of smokers and 78% of non-smokers disagreed that there
8 was no risk to the smoker for the first few years of smoking. JD-025085. Question 5(2) from
9 the same survey asked whether there was harm to the smoker from smoking the very next
10 cigarette. 69% of teen smokers and 75% of teen nonsmokers indicated there was. JD-025085.
11 Dr. Slovic's earlier data had demonstrated similar findings. For instance, in his 2000 article,
12 *What Does It Mean to Know a Cumulative Risk*, when he asked if "every single cigarette smoked
13 causes a little bit of harm," over 90% of adolescents agreed.

14 Q: How do you interpret this data?

15 A: The data do not support Dr. Slovic's assertions that youth believe it is safe to smoke for
16 only a short period of time, or in small amounts, or only occasionally.

17 Q: Have you reached an opinion to a reasonable degree of scientific certainty about
18 how the U.S. population perceives the health risk from cigarette smoking?

19 A: Yes, I have. Both smokers and nonsmokers, adults and youths, and people across a wide
20 spectrum of educational levels, significantly overestimate the health risks associated with
21 smoking.

22 V. ANALYSIS OF DR. WEINSTEIN AND SLOVIC'S OPINIONS REGARDING
23 RISK PERCEPTION

1 Q: Dr. Viscusi, have you read Dr. Slovic and Dr. Weinstein's expert reports, their
2 depositions, and their trial testimony in this case?

3 A: Yes.

4 A. Analysis of Dr. Slovic's Opinions

5 Q: I'd like to first ask you some questions about how your opinions and methods may
6 differ from Dr. Slovic's. Dr. Slovic has endorsed something called the "affect heuristic" as
7 a model to explain, at least in part, how smokers may make decisions about smoking. Can
8 you explain what the "affect heuristic" is and how Dr. Slovic proposes that it might
9 influence smoker decision making and behavior?

10 A: Yes. Under Dr. Slovic's "affect heuristic" theory, "affect" is a subtle emotion of
11 "goodness" or "badness" that a person experiences in response to or in connection with a
12 stimulus. Dr. Slovic proposes that apart from or outside of rational thinking processes, a person
13 "tags" a positive or negative quality concerning a stimulus in an "affect pool." Paul Slovic,
14 *Cigarette Smokers: Rational Actors or Rational Fools?* in SMOKING: RISK, PERCEPTION, &
15 POLICY (Paul Slovic ed., 2001) at 99-102, US Ex. 63931. His theory postulates that "affect"
16 influences judgment because "[i]n the process of making a judgment or decision, an individual
17 consults or refers to an 'affect pool' containing all the positive and negative tags...." *Id.* at 101.
18 He claims that when presented with a choice, instead of evaluating risks and benefits, consumers
19 experience, in a "holistic" and "automatic" manner, a subtle emotion or feeling of "goodness or
20 "badness" (which he labels a "vibe") that "may [thus] serve as a cue for many important
21 judgments." *Id.* at 102.

22 Q: And what type of subtle emotion or "vibe" does Dr. Slovic propose that consumers
23 experience concerning smoking?

1 A: The first important point here is that in accordance with Dr. Slovic's theory, affect can be
2 either "good" or "bad," "positive" or "negative." Inferentially then, a "good" or "positive"
3 image "tag" about cigarettes or smoking might positively motivate smoking behavior, and a
4 "bad" or "negative" image might negatively motivate smoking behavior. Dr. Slovic
5 hypothesizes that if smokers have "positive" affect, they may rely on positive feelings about
6 smoking and ignore risk information, and thereby become, in his words, "rational fools." *Id.* at
7 123.

8 Q: Does Dr. Slovic propose that these "affective feelings" completely displace rational
9 decision making?

10 A: No, in fact, Dr. Slovic acknowledges that he is "certain" that rational decision making is
11 still important, although he cannot say how much influence "affect" may actually have. 1/18/05
12 Tr. Tran. at 10333-10340. He says that the potential influence of "affect" may be a function of
13 the particular situation . *Id.* at 10334-10335.

14 Q: Do you agree with Dr. Slovic that people's decisions about smoking are governed by
15 affective responses to external stimuli, rather than reasoned analysis?

16 A: No, I don't.

17 Q: Why not?

18 A: For two principal reasons. First, his underlying theory lacks scientific confirmation as a
19 general theory of consumer behavior, and there is no empirical evidence linking his hypothesis to
20 smoking decisions. Second, the actual empirical data on smoking behavior, even Dr. Slovic's
21 own data, do not support his theory. Rather, the empirical data show that smoker's decisions are
22 consistent with decision making in which costs and benefits enter in the usual economic fashion.

23 Q: In what way or ways does Dr. Slovic's theory lack scientific confirmation?

1 A: The theory has not been empirically tested, and it conflicts with the empirical data that
2 we have. Dr. Slovic introduced his theory of the affect heuristic in an article entitled, *The Affect*
3 *Heuristic in Judgment of Risks and Benefits*, by Finucane, Alhakami, Slovic & Johnson (2000).
4 Finucane, M., Alhakami, A., Slovic, P., Johnson, S., *The Affect Heuristic in Judgment in*
5 *Judgments of Risks and Benefits*, JOURNAL OF BEHAVIORAL DECISION-MAKING, 13:1-17 (2000),
6 US Ex. 63942. He acknowledged in that article that his affect heuristic theory was untested, in
7 fact, he said “the challenge [was] to begin hypothesizing about and testing models” for affect.
8 *Id.* at 14. But in the few years since he made that statement, Dr. Slovic has not published data
9 reflecting any scientific confirmation of his theory. In fact, the data that Dr. Slovic himself has
10 helped gather are quite inconsistent with his theory. This includes data Dr. Slovic reported
11 before the Finucane article, as well as data reported since that article was written. These data are
12 strongly inconsistent with Dr. Slovic’s theory, yet he offers no means by which to reconcile these
13 inconsistencies.

14 Q: What type of data relevant to his theory of “affect” has Dr. Slovic collected and
15 reported?

16 A: There are two types of data. First, there are experimental data in which Dr. Slovic states
17 he has attempted to create conditions that would maximize people’s use of affect. There are also
18 data in which people were asked to state whether they experienced feelings of “goodness” or
19 “badness,” or described positive or negative images associated with stimuli such as smoking.

20 Q: What is the logical place to begin the analysis of those data?

21 A: The logical starting point in Dr. Slovic’s data is whether they show “positive” or
22 “negative” affect, because under Dr. Slovic’s theory, that would inform whether the “affect”
23 people report would motivate decisions for or against smoking.

1 Q: How is “affect” measured?

2 A: The primary metric that Dr. Slovic has suggested for evaluating the presence and

3 direction of affect is the direction of perceived “benefit” and perceived “risk,” along with

4 whether there is a wide divergence between perceived risk and perceived benefit. 1/18/05 Tr.

5 Tran. at 10346. Paul Slovic, *Cigarette Smokers: Rational Actors or Rational Fools?* in

6 SMOKING: RISK, PERCEPTION, & POLICY (Paul Slovic ed., 2001) at 105-106, US Ex. 63931.

7 According to Dr. Slovic, if the perceived risk is low and benefit high, then affect is “positive”

8 (which is what he conjectures in his testimony in this case to be the case for cigarettes), and if the

9 perceived risk is high and benefit low, then affect is “negative.” *Id.* 1/18/05 Tr. Tran. at 10348.

10 Put in this manner Dr. Slovic’s affect theory cannot be distinguished from standard economic

11 models of rational choice. In the rational economic framework, if the benefits of the product are

12 high and the perceived risks are low, the net benefit of the product to the consumer will be high.

13 If the risk is high and the benefit is low, the product will be unattractive for purchase by a

14 rational consumer. Thus, to the extent that there is any empirical validity to these aspects of Dr.

15 Slovic’s discussion, it is because these same relationships are characterized by rational economic

16 behavior. They do not constitute tests of Dr. Slovic’s theory, however.

17 Q: What do Dr. Slovic’s data on affect show?

18 A: Dr. Slovic’s experimental data demonstrate that experimental subjects reported that

19 cigarettes had the highest risk of any product or activity tested, and they also had the highest

20 mean difference between perceived risk and perceived benefit of all the hazards tested.

21 Alhakami, A., Slovic, P., *et al.*, *A Psychological Study of the Inverse Relationship Between*

22 *Perceived Risk and Perceived Benefit*, RISK ANALYSIS, Vol. 14, No. 6 (1994), JD-025174. In

23 another study, Dr. Slovic reported that cigarettes received the lowest rating for “positive

1 concepts" and "positive outcomes," and the highest rating for "negative outcomes" of any
2 product or activity examined. Benthin, A., Slovic, P., Moran, P., Severson, H., Mertz, C.K.,
3 Gerrard, M., *Adolescent Health-Threatening and Health Enhancing Behavior*, JOURNAL OF
4 ADOLESCENT HEALTH, 1995:17:143-152, JD-025086. In still another experiment, Dr. Slovic
5 found that smoking received the highest risk rating of any product or activity examined.
6 Finucane, M., Alhakami, A., Slovic, P., Johnson, S., *The Affect Heuristic in Judgment in*
7 *Judgments of Risks and Benefits*, JOURNAL OF BEHAVIORAL DECISION-MAKING, 13:1-17 (2000),
8 US Ex. 63942. All three of these experiments produced data that are flatly inconsistent with Dr.
9 Slovic's theory of positive affect for cigarettes. In fact, in his cross-examination testimony, Dr.
10 Slovic stated that his data presented a paradigm case for negative affect, not positive affect.

11 1/18/05 Tr. Tran. at 10346-52. I report similar results in my book, SMOKING: MAKING THE
12 RISKY DECISIONS, as respondents to the 1985 Audits and Surveys study report numerous
13 negative mentions in response to an open-ended memory probe. JD-004648.

14 Q: Has Dr. Slovic gathered any data on "affect" since the Finucane 2000 article?

15 A: Yes. Dr. Slovic participated in the Annenberg-II survey. In that survey, respondents
16 were asked a number of questions clearly designed to elicit "affective" responses. Remarkably,
17 Dr. Slovic makes no mention at all of those data in his testimony.

18 Q: To what Annenberg-II data are you referring?

19 A: The Annenberg-II series of questions grouped under Questions QS2 and QS3, which
20 asked respondents such things as whether the image of smoker is "very good," "somewhat
21 good," "somewhat bad," or "very bad," and which asked respondents to describe existing images
22 they had of a smoker or of smoking. Appendix B to SMOKING: RISK, PERCEPTION & POLICY,
23 Paul Slovic ed., (2001), JD-022826.

1 Q: And what were the results?

2 A: Overall, the “images” that respondents reported about smokers and smoking were
3 strongly negative, and youths expressed even more negative imagery about smokers and
4 smoking than adults. Again, Dr. Slovic’s own data indicate negative, not positive “affect.” QS2,
5 QS3_1 through QS3_11, JD-025085.

6 Q: Could you give us some examples?

7 A: Sure. QS3 asks: “Next, please try to form an image in your mind of a person smoking a
8 cigarette. Do you have an image of a person smoking? Tell me about this person. Is the person
9 ...” A list of response options is then read to the respondent. The “positive” options included
10 images of the person eating a good meal, just finishing something satisfying, being attractive,
11 relaxed, happy, popular, or being a celebrity or famous person. JD-022826. “Negative” images
12 included the person being alone, sick, or anxious. JD-022826. The skew in responses that Dr.
13 Slovic got was not only towards the “negative” side, it was quite interesting in terms of age
14 comparisons as well. Across those categories, adults uniformly responded with higher response
15 ratings on the “positive” images, and the younger age group surveyed (14-22) uniformly
16 responded with higher ratings on the “negative” images. QS2, QS3_1 through QS3_11, JD-
17 025085.

18 Q: Are there other similar examples from Annenberg-II?

19 A: Yes. QS1 asked “When you hear the word (smoking / cigarette), what is the first thought
20 or image that comes to mind?” JD-022826. QS2 asked: “How would you describe this image?
21 Is it something very good, somewhat good, somewhat bad, or very bad?” JD-022826. Again,
22 adult smokers were more likely to respond positively than adolescents. 34.5% of adult smokers
23 rated the image as somewhat or very good. JD-025085. 12.26% of adult smokers said “very

1 good" and 22.26% said "somewhat good." JD-025085. But in the 14-22 age category, only
2 5.23% described the image as very good and 18.20% said it was somewhat good, totaling
3 23.43%. JD-025085. Similarly, more 14-22 year olds considered the image bad or somewhat
4 bad than did adults. QS2, JD-025085.

5 Q: Overall, what do Dr. Slovic's data show regarding "affect" and cigarette smoking?

6 A: Dr. Slovic's theory is that if "affect" is positive, that might cause people to discount or
7 ignore risks. However, his own experimental results, consistently and across different study
8 designs, indicate that "affect," as he conceptualizes it, is quite negative for cigarettes. According
9 to his theory, that would cause people to judge the risks of smoking even higher than they would
10 based only upon smoking risk information. Similarly, his own data from Annenberg-II suggest
11 that people have negative, not positive affect for cigarette smoking.

12 Q: How about the actual risk perception data Dr. Slovic has reported. Do people,
13 especially adolescents, report a high or low risk perception for cigarettes?

14 A: As I have already testified, across virtually all quantitative measures, people, and
15 especially adolescents, tend to overestimate the risks of smoking.

16 Q: Dr. Slovic has also pointed to non-smoking related experimental data in support of
17 his "affect heuristic" theory. Do the data and results from those experiments support his
18 "affect heuristic" theory?

19 A: No. The other experimental data that Dr. Slovic points to, principally experiments by
20 Zajonc (1980) and Bornstein (1989), do not provide support for his theory. Zajonc, R.B.,
21 *Feeling and Thinking: Preferences Need No Inferences*, AMERICAN PSYCHOLOGIST, February
22 1980, 151-175, US Ex. 63924; Bornstein, R.F., *Exposure and Affect: Overview and Meta-
23 Analysis of Research, 1968-1987*, PSYCHOLOGICAL BULLETIN, Vol. 106, No. 2, 265-289 (1989),

1 US Ex. 72923.

2 Q: Why don't the results of those experiments support his theory?

3 A: First, neither experiment sought to simulate the types of decisions that smokers actually
4 make. In other words, the experiments did not possess the important attributes of the real world
5 environment in which smoking decisions are made. Zajonc, for instance, created experiments in
6 which people were presented with a stimulus of nonsense phrases or Chinese ideographs. He
7 reported a correlation between the number of exposures a person had to a particular stimulus and
8 whether that person reported an increased "liking" for the stimulus. Putting aside that a test
9 subject's report of "liking" may simply have been a surrogate for his or her ability to recognize
10 or recall the stimulus, the whole purpose of Zajonc's experiment was to examine experimental
11 responses to "unreinforced" exposures to entirely unfamiliar stimuli, in other words, to create a
12 situation in which the experimental subject was presented with a stimulus about which she had
13 no previous information. That set of experimental variables is quite distinct from the
14 information environment with respect to cigarette smoking. In fact, Dr. Slovic's "affect" data
15 indicate that his subjects tended to report a "disliking" of cigarettes. Moreover, Zajonc's
16 experiment did not involve a product, a health risk, or any decision involving a trade-off between
17 risk and benefit. Again, in Dr. Slovic's data, cigarettes presented a "paradigm case" of a
18 perceived high-risk, low-benefit product. In short, there is no basis to generalize Zajonc's off-
19 point laboratory results to real-world decisions about smoking.

20 Q: What about Bornstein's research? Why doesn't it support Dr. Slovic's theory?

21 A: Bornstein's research is similarly inapplicable to real-world decision making processes
22 concerning smoking, because he also experimented with "unreinforced" exposures in a
23 laboratory setting that doesn't have any similarity to the risk tradeoffs that are involved in

1 smoking decisions. Bornstein sought to test whether “mere exposure” to unreinforced stimuli
2 might promote liking, and even within the controlled environment of a laboratory, his results
3 were inconsistent across age groups. He found a mildly positive result for adults, but a mildly
4 negatively one for children. Just like Zajonc’s experiments, these data have no relevance to the
5 actual information environment concerning smoking, and they can’t be generalized to actual
6 decisions about smoking. And Dr. Slovic’s experimental data on “affect” and cigarettes are
7 again inconsistent with his proposed extension of the Bornstein data.

8 Q: Are the actual empirical data on smoking consistent or inconsistent with “positive
9 affect” as proposed by Dr. Slovic?

10 A: The data are inconsistent with “positive affect” in the way that Dr. Slovic proposes. In
11 other words, the data do not suggest that people make decisions apart from or in some way
12 independent of rational processes. Instead, the data show that smokers alter their smoking
13 behavior in response to the costs and perceived risks of smoking in consistent and predictable
14 ways that correspond to their decisions and behaviors about other products. For instance, as
15 peoples’ perceptions of the risks grew in the 1950s and early 1960s, they changed their smoking
16 behaviors and their consumption of cigarettes in ways that are quite consistent with rational
17 decision making processes. Similarly, as the government and the public health community
18 endorsed a “switch to low tar if you can’t or won’t quit” message in the 1970s and 1980s,
19 smokers migrated to those products. Likewise, as the monetary and non-monetary costs of
20 smoking have increased, smoking behavior and consumption have changed in ways that are
21 consistent with rational decision making processes.

22 Q: Dr. Slovic maintains that many smokers express regret over their decision to begin
23 smoking, and that a greater number express an intent to quit than those who are actually

1 successful. Why isn't that an indication that people don't have an adequate understanding
2 of the risks when they begin?

3 A: For several reasons. Dr. Slovic bases his opinion about "regret" on people's answers to a
4 particular question in the Annenberg-II survey. That question provides a very poor framework
5 for assessing what information people had at hand when they began to smoke. He also suggests
6 that people underestimate the difficulty of quitting, but again, the data he uses are ill-suited to his
7 intended task.

8 Q: What are the problems with Dr. Slovic's data and methods on this issue?

9 A: Dr. Slovic asserts that the responses to Question 19 in Annenberg-II demonstrate that
10 smokers were inattentive to the risks when they began smoking, and that they regret their
11 decision. Slovic Written Direct at 11-15, 29-31.

12 Q: What are some of the problems in Dr. Slovic's analysis of these survey responses?

13 A: First, it is quite difficult to get people to go back in time and reconstruct an event in any
14 survey because people cannot distinguish the information they had in the past from more recent
15 information. Here, Dr. Slovic relies on a response in a telephone survey that is particularly ill
16 suited to getting a person to accurately construct what may have been going through their mind
17 years ago, and to elicit an unbiased response. Dr. Slovic also chose a very ill-suited question to
18 examine that phenomenon. Question 19g asks a hypothetical question that everyone responding
19 to the question would know presented an impossibility: what a person would do "if [they] had it
20 to do over again." *Id.* at 29. It is well understood in the scientific survey literature that questions
21 which are designed to elicit hindsight-based responses tend to be poor measures of
22 reconstructing events or processes which actually occurred in the past. We really don't know
23 what validity to attach, if any, to a question that asks about an outcome the respondent knows

1 simply cannot happen. Question 19g thus presents a poor means by which to evaluate what
2 people's perceptions of the risks of smoking may have been at the time they began, or how much
3 attention they paid to those risks. Second, it is also well understood in the scientific literature on
4 surveys that the order in which questions are asked in a survey may significantly influence the
5 responses that are given. In particular, questions which precede a particular survey question of
6 interest may influence the later response of interest. By the time survey participants who were
7 smokers responded to Question 19, they had been asked many questions that vividly emphasized
8 both the risks of smoking, and the "non-normative" aspects of smoking. 1/18/05 Tr. Tran. at
9 10307-10308. These questions would have tended to suggest to respondents that perhaps their
10 decision to smoke may not have been the soundest or most socially acceptable under the
11 circumstances. People would predictably respond to such a question by offering reasons that
12 would tend to make their decision seem more appropriate or defensible (e.g., "OK, so it sounds
13 like I made an unwise or unacceptable decision, but I didn't give it much thought"). Thus, it is
14 quite unreasonable to assume that the responses to question 19 were not biased by the structure
15 and language of the survey instrument. In fact, Dr. Slovic acknowledges that they may have
16 been biased. *Id.* at 10308.

17 Q: Dr. Slovic has also asserted that smokers believe that they can "get away with" some
18 amount of smoking before the "risk takes hold" because, under the "affect heuristic"
19 "seeing is believing" and they see little evidence of their peers being harmed by smoking.
20 Do you agree with that opinion?

21 A: No. This is one of his principal themes, but again, his own data strongly refute his
22 theory. Paul Slovic, *Cigarette Smokers: Rational Actors or Rational Fools? in SMOKING: RISK,*
23 *PERCEPTION, & POLICY* (Paul Slovic ed., 2001) at 109, US Ex. 63931.

1 Q: In what way?

2 A: As I have already described, the data from Dr. Slovic's earlier surveys and from the
3 Annenberg-II and Weinstein, Slovic (2001) surveys demonstrate that adolescents have quite
4 extraordinary beliefs about how quickly a person "accrues" smoking risks, and how even very
5 small amounts of smoking create significant health risks.

6 B. Analysis of Dr. Weinstein's Opinions

7 Q: How does Dr. Weinstein's evaluation of smokers' perceptions of the risks compare
8 with Dr. Slovic's?

9 A: Unlike Dr. Slovic, Dr. Weinstein endorses the view that people evaluate smoking risks in
10 a rational manner. In fact, Dr. Weinstein believes that if people had additional information about
11 the risks of smoking, fewer people would smoke, and fewer adolescents would begin smoking.

12 *See generally*, Weinstein Written Direct at 19-23.

13 Q: Do you agree with Dr. Weinstein that providing additional risk information would
14 lower smoking rates or reduce youth smoking initiation?

15 A: No.

16 Q: Why not?

17 A: Because Dr. Weinstein's opinion that additional risk information would alter people's
18 smoking behavior is also a theory for which there is no empirical validation. The empirical data
19 that we have strongly suggest that people presently overestimate the risks of smoking, and that if
20 further accurate information about the risks were made available and were found convincing, that
21 the impact on smoking rates would be the opposite of what Dr. Weinstein suggests.

22 Q: Why do you say that Dr. Weinstein's theory has not been empirically validated.

23 A: Dr. Weinstein's theory about smoking risk information is a "prescriptive" or "normative"

1 model, and not a “descriptive” model of the information that people actually use or the way that
2 they make decisions. In other words, he is not describing how people actually make decisions,
3 but rather he is proposing what information people *should* have and how they *should* make
4 decisions about smoking under “ideal world” assumptions. His assumptions that people would
5 act and decide differently under those ideal world circumstances have not been tested.

6 Q: Is there a sound scientific basis to conclude that people would make “better” or at
7 least different decisions about smoking if they had the information Dr. Weinstein suggests?

8 A: I don’t believe so. Dr. Weinstein begins by observing that there is a relationship between
9 people’s perceptions of the risks of smoking and their smoking behavior. In fact, he cites my
10 research for that proposition, and I agree with him on that point. (Weinstein May 2002
11 Addendum: “There is also considerable evidence demonstrating that risk perceptions are linked
12 to smoking behavior. In fact, Viscusi (2000) refers to ‘the aforementioned empirical evidence
13 [his own research described on the previous page] that shows a very substantial link between
14 perceived risks of smoking and the probability that one will engage in this behavior.’”). Where
15 Dr. Weinstein goes wrong, in my opinion, is with his assumption that people have an important
16 information deficit about the risks of smoking, and that if this supposedly “deficient” set of risk
17 perceptions could be changed, people would make different smoking decisions and reduce their
18 smoking behavior. There are several major flaws in these assumptions.

19 Q: What are those flaws?

20 A: First, the hypothesis of an “information deficit” about smoking risks has been tested in a
21 variety of ways many times over several decades. At least since the early 1980s, there is no
22 empirical support for the proposition that by providing additional information about the risks of
23 smoking that smoking behavior can be reduced. Second, to the extent that people do not have

1 the very detailed type of knowledge that Dr. Weinstein suggests is “essential,” there is no
2 empirical support that the information that Dr. Weinstein views as being “essential” is more
3 salient than the information that virtually all people report they already have. Third, the studies
4 that Dr. Weinstein points to do not provide empirical support for his claim that if people had the
5 additional risk information he advocates, they would make different smoking decisions.

6 Q: Let’s take those one at a time. First, what is the history of empirical research on the
7 “information deficit” hypothesis?

8 A: In the 1970s and 1980s, a number of studies were undertaken to assess whether
9 interventions based on providing adolescents with additional information about the health effects
10 of smoking would change their smoking behavior. As the Surgeon General notes in the 1994
11 Surgeon General’s Report, “smoking-prevention programs based on the information deficit
12 approach were not effective.” *Preventing Tobacco Use Among Young People: A Report of the
13 Surgeon General* (1994) at 217, US Ex. 64693. Later, the two large government sponsored
14 intervention studies that I mention in my second book on smoking again confirmed the absence
15 of any “information deficit” about the health risks of smoking.

16 Q: What were those studies?

17 A: The first is referred to as the “COMMIT” study. *Community Intervention Trial for
18 Smoking Cessation (“COMMIT”) I. Cohort Results from a Four-Year Intervention*, AMERICAN
19 JOURNAL OF PUBLIC HEALTH, February 1995, JD-062352; *Community Intervention Trial for
20 Smoking Cessation (“COMMIT”) II. Changes in Adult Cigarette Smoking Prevalence*,
21 AMERICAN JOURNAL OF PUBLIC HEALTH, February 1995, JD-000732; *Community Intervention
22 Trial for Smoking Cessation (“COMMIT”): Summary of Design and Intervention*, JOURNAL OF
23 THE NATIONAL CANCER INSTITUTE, Vol. 83, No. 22, November 20, 1991, 1620-1628, JD-

1 003230. The second is the Hutchinson study. Peterson, A., Kealey, K., Mann, S., Marek, P.,
2 Sarason, I., *Hutchinson Smoking Prevention Project: Long-Term Randomized Trial in School-*
3 *Based Tobacco Use Prevention—Results on Smoking*, JOURNAL OF THE NATIONAL CANCER
4 INSTITUTE, Vol. 92, No. 24, December 20, 2000, 1979-1991, US Ex. 64684. COMMIT was an
5 extensive community-based, multi-channel intervention designed to increase quit rates among
6 smokers over a five-year period. One of the components of COMMIT was a series of
7 interventions designed to provide additional information about the health risks of smoking.
8 Despite these interventions, COMMIT demonstrated virtually no impact on quit rates, especially
9 among those who were the main targets of the program, heavy smokers. There was actually a
10 slightly lower quit rate for heavy smokers in the intervention communities than in the control
11 communities. And although COMMIT reported a very modest increase in quit rates among
12 light-to-moderate smokers (about 3 percent), even that very small estimate of impact is flawed
13 because it did not control for the pre-existing higher quit rates in the intervention communities.

14 Q: What about the other study you mentioned, the Hutchinson study?

15 A: Hutchinson was a school-based intervention that included both social influences and
16 information within the 15 ‘essential elements’ for school-based tobacco prevention
17 recommended by an NCI Expert Advisory Panel. It also met the CDC’s guidelines for effective
18 school-based programs for preventing tobacco use. In fact, it has been described in the literature
19 as the “gold standard” for school-based interventions. Yet Hutchinson also showed no evidence
20 consistent with an “information deficit” hypothesis. Instead, after a multi-year intervention
21 comprising over 45 hours of classroom work that included instruction on health motivations, the
22 long-term and short-term health effects of smoking, addiction, correcting “misperceptions” about
23 smoking being “normative” and promoting “tobacco free norms,” there was no difference in

1 smoking between students who received the intervention and those who did not. The lack of
2 impact in both of these large intervention studies is consistent with the conclusion that smokers
3 and potential smokers were already well aware of the risks of smoking.

4 Q: You mentioned that there is no empirical support for Dr. Weinstein's assertion that
5 the additional information he suggests would impact smoker behavior. Could you please
6 elaborate on that?

7 A: Yes. Dr. Weinstein's basic approach is that "more is better." As my previous testimony
8 indicates, the various experimental tests of the "information deficit" hypothesis have not
9 validated that approach. In fact, as Dr. Weinstein himself conceded, 94% of people responded in
10 a recent survey that they considered themselves adequately informed about the risks of smoking.

11 2/14/05 Tr. Tran. at 13122-13123. Moreover, Dr. Weinstein has come forward with no data
12 which would support the seemingly dubious assumption that if people believed that smoking
13 caused lung cancer, but were nonetheless willing to take that risk, that by increasing their
14 awareness of lesser known disease relationships (such as other less recognized types of cancer)
15 they would be less willing to accept the risk. In fact, as Dr. Slovic acknowledged, it would be
16 difficult to conceive of another disease that people would "dread" as much as lung cancer.

17 Slovic, March 13, 2002 *USA Dep.* at 345-46.

18 Q: Dr. Weinstein also suggested that in order to make informed decisions, people must
19 be able to accurately compare smoking risks to mortality risks from things like illegal
20 drugs, driving, or drinking alcohol. Do you agree?

21 A: No. People don't face a smoking decision in the "either/or" context in which that
22 information could be salient. The question is not "will I smoke, or will I drive," or "if I smoke,

1 am I more likely to die in an automobile accident," and people's tendencies to overestimate or
2 underestimate collateral risks have no bearing on their smoking decisions.

3 Q: At page 71 of his written direct examination, Dr. Weinstein testified that he was
4 describing the risk perceptions of a typical smoker. He later testified at trial, at pages
5 13098 to 13101 of the trial transcript, that he did not consider the actual smoking risk
6 information the typical smoker received, or the information environment in which the
7 typical smoker lived. When the Court then asked him what he meant by a "typical
8 smoker," he testified that a "typical smoker" was the middle or most frequent response
9 reflected in the particular survey questions he was discussing. Is that a scientifically valid
10 way of describing a typical smoker?

11 A: No, Dr. Weinstein's assertion that the "typical smoker" is the middle or most frequent
12 response to the particular questions he chose is fallacious. He is saying, by definition, that each
13 question he chose defines the typical smoker. Thus, even within a single survey the so-called
14 typical smoker will not be the same person across different smoking questions. His typical
15 smoker may even have a quite different demographic profile across questions. Defining a typical
16 smoker in the manner he has is even more curious in light of the testimony he gave in his
17 September 5, 2002 deposition at pages 104-105, that "there is no present agreement as to what
18 the best questions [are to assess public perception of the risk] or even the appropriate criteria."

19 Q: Are there other flaws in his approach to describing a "typical smoker."

20 A: Yes. He did not take into account responses to survey questions that he ignored or
21 discounted. Obviously, had he included the questions on perceptions of lung cancer and
22 smoking mortality, his "typical smoker" would now be overestimating the salient health risks, as
23 these types of questions uniformly show. And Dr. Weinstein's tendency to omit important

1 information extends to a variety of analyses and information. Dr. Weinstein simply ignores the
2 smoking risk information environment. But individuals are not born with risk perceptions, their
3 risk beliefs are determined by the nature of the risk information they have acquired and the
4 manner in which they have acquired it. In my first book on smoking, I analyzed various
5 frameworks or perspectives for the evaluation of smoking behavior, and demonstrated why an
6 understanding of the sources of risk information and the determinants of risk perception is
7 important to the analysis of risk beliefs. These perspectives provide important reference points,
8 and a means for evaluating both the accuracy of risk perceptions and the rationality of behavior
9 based on those perceptions.

10 Q: What about the additional studies that Dr. Weinstein mentioned in the "addendum"
11 to his expert report? Do any of those demonstrate an empirical relationship between
12 increased awareness of smoking risks and reduced smoking behavior?

13 A: No, not at all.

14 Q: What studies or data does Dr. Weinstein rely on?

15 A: A paper by Flay, two papers by Klesges, and data from a response given in the
16 Weinstein, Slovic (2001) survey.

17 Q: Let's begin with Flay, why doesn't that paper support Dr. Weinstein's opinion?

18 A: Dr. Weinstein cites Flay's 1994 paper, Flay, *et al.*, "Differential influence of parental
19 smoking and friends' smoking on adolescent initiation and escalation of smoking." Flay, B., *et*
20 *al., Differential Influence of Parental Smoking and Friends' Smoking on Adolescent Initiation*
21 *and Escalation of Smoking*, JOURNAL OF HEALTH AND SOCIAL BEHAVIOR, Vol. 35 (September),
22 248-265 (1994), US Ex. 63839. However, the purpose of that study was to see how *parental* and
23 *peer* smoking influenced adolescents' smoking behavior: "The purposes of this study were to

1 examine the differential influence of parental smoking and friends' smoking on adolescents'
2 initiation and escalation of smoking, and to explore gender and ethnic differences in parental and
3 friends' influences on adolescents' smoking behavior." *Id.* at 259. Flay found that both peer and
4 parental smoking had indirect effects on smoking behavior, and that adolescents whose parents
5 and peers smoked didn't forecast as many "bad outcomes" from smoking as adolescents whose
6 parents and peers did not smoke. What Dr. Weinstein also importantly fails to mention is Flay's
7 finding that "[a]lthough the study intervention influenced some mediating variables, the
8 intervention did not influence cigarette smoking or other drug use. Thus, smoking rates in the
9 intervention group did not differ significantly from that of the control group at baseline and after
10 intervention." *Id.* at 262 (citations omitted). Thus, Flay's results do not support his hypothesis,
11 they simply lend additional support for the theory that observing role models who smoke may
12 impact adolescents' outcome expectations. Flay's data clearly do not demonstrate that providing
13 risk information would *change* an adolescent's outcome expectations, much less adolescent
14 smoking behavior. Dr. Weinstein also doesn't mention that Flay attempted to test the latter
15 hypothesis in a paper the following year. Flay, B., *et al.*, *The Television, School and Family*
16 *Smoking Prevention and Cessation Project: VIII Student Outcomes and Mediating Variables*,
17 PREVENTIVE MEDICINE, 24, 29-40 (1995), JD-065591. That paper evaluated a school-based
18 cessation program that included health-based education. But like so many other information-
19 based interventions, the intervention in that study did not prove to be a significant predictor of
20 smoking behavior when people who received the intervention were compared to "untreated"
21 controls.

22 Q: What about the Klesges articles? Do they show that additional information about
23 health risks was associated with changed smoking behavior?

1 A: No. In the first article, Klesges examined a small sample of people and reported that
2 perceived smoking risks were correlated with taking a first step in participating in a smoking
3 cessation program. Klesges, R., *et al.*, *Factors Associated with Participation, Attrition, and*
4 *Outcome in a Smoking Cessation Program at the Workplace*, *HEALTH PSYCHOLOGY*, 7(6), 575-
5 589 (1988), US Ex. 63837. But that perception was not correlated with actually following
6 through with the program, or actually quitting smoking, either when people's behaviors were
7 evaluated at the conclusion of the study, or 6 months later. *Id.* at 585, Table 3. In fact, the only
8 belief that Klesges found correlated with smoking cessation was belief about weight gain upon
9 cessation.

10 Q: What about the second Klesges article?

11 A: The second Klesges article reports results that are strikingly inconsistent with Dr.
12 Weinstein's assumption that smokers are ill-informed about the risks of smoking. Klesges, R. *et*
13 *al.*, *Knowledge and Beliefs Regarding the Consequences of Cigarette Smoking and Their*
14 *Relationships to Smoking Status in a Biracial Sample*, *HEALTH PSYCHOLOGY*, 7(5), 387-401
15 (1988), US Ex. 63838. In that study, Klesges found that very high percentages of smokers
16 reported their belief that smoking causes diseases such as lung cancer (98 to 100%), heart disease
17 (78-88%), and emphysema (91-96%). The study authors also administered a "quiz" to smokers
18 about smoking related and non-smoking related diseases. A "perfect" score was 15 and the mean
19 correct score was 11.5, with smokers scoring, on average, between 10.5 and 11.3. Klesges made
20 no claim that the approximate 1 point difference between smokers and non-smokers predicted
21 any form of smoking behavior or cessation.

22 Q: You mentioned data from Weinstein, Slovic (2001), to which Dr. Weinstein pointed.
23 What was that, and what is the impact of those data?

1 A: Dr. Weinstein pointed to a response to Question 42 in the Weinstein, Slovic (2001)
2 survey. Weinstein Written Direct at 68-71; Tables: Various Questions on Cause of Death and
3 Cigarettes; Run 4/1/2001, JD-025084. Question 42 asked respondents to guess, if they were
4 called again in a year, whether they would have quit smoking. No one was actually called a year
5 later, because the survey was cross-sectional, not longitudinal.

6 Q: How many 15 to 19 year olds “guessed” they would have quit?

7 A: 59. But the very small sample size isn’t the most important problem. As I explained
8 above, this question and the same question that was in Annenberg-II is clearly problematic
9 because of survey order effect and the nature of the questions that had been asked previously in
10 the survey. Additionally, since there is no longitudinal data in either survey, it is impossible to
11 know whether the “guesses” that respondents were asked to give correlated with their actual
12 behavior.

13 Q: Are there any longitudinal data that can be used to make a valid comparisons about
14 success rates?

15 A: Yes, and I would like to discuss that in connection with my testimony about whether
16 people have unrealistic expectations about their ability to quit smoking. *See Johnston, L.D., et*
17 *al., Monitoring the Future: National Survey Results on Drug Use, 1975-2000, Volume I:*
18 *Secondary School Students*, (NIH Publication No. 01-4924), Bethesda, Md: National Institute on
19 Drug Abuse (2001), US Ex. 64699.

20 Q: To conclude this section of your testimony about both Dr. Weinstein and Dr.
21 Slovic’s methods and conclusions, do they reflect methodologies and conclusions that are
22 widely accepted in the scientific community concerning smokers’ perceptions of the risks?

23 A: No, both Dr. Weinstein and Dr. Slovic’s proposed explanations fundamentally ignore

1 overwhelming empirical data that people are aware of the risks of smoking, and act in ways that
2 are consistent with awareness of those risks. Dr. Slovic does not contest the “well-known
3 association of cigarettes with cancer” (Paul Slovic, *Cigarette Smokers: Rational Actors or*
4 *Rational Fools? in SMOKING: RISK, PERCEPTION, & POLICY* (Paul Slovic ed., 2001) at 108, US
5 Ex. 63931) or that the majority of persons exposed to the same risk information environment
6 choose not to smoke. Instead, he proposes an explanation for smoker behavior that focuses on a
7 proposed non-rational process called the “affect heuristic.” As such, he maintains that smokers
8 act as “fools,” proposing that their actions are rationally inconsistent with those known risks. *Id.*
9 at 123. But Dr. Slovic hasn’t been able to confirm his “affect heuristic” theory with empirical
10 data, and the empirical data he has gathered stands in stark contrast to what his theory would
11 predict.

12 Q: In what way do Dr. Slovic’s data on affect conflict with his theory?

13 A: If there is any evidence of attitudes of “affect” in Dr. Slovic’s data about smoking, it is
14 negative affect, not positive affect. From an empirical standpoint, Dr. Slovic cannot connect his
15 hypothesis of affective attitudes to smoker behavior. Instead, his theory faces the additional
16 powerful empirical rebuttal of actual consumer behavior. Were his theory of affect (that affect,
17 when present, causes a wide divergence between perceived risks and perceived utility) correct in
18 predicting consumer behavior, cigarettes should demonstrate very atypical price elasticities of
19 demand. But they do not. In fact, cigarette price elasticities are similar to many widely used
20 consumer products. Similarly, if affect actually influenced behavior in the way Dr. Slovic’s
21 theory would predict, then the observed risk-money tradeoffs that economists have estimated for
22 jobs and products would differ wildly depending on the degree of affect. In contrast, these
23 fundamental risk tradeoffs are quite similar across a wide variety of domains of choice and show

1 no evident influence of Dr. Slovic's conjectured affect. Finally, in his effort to support his
2 theory that people act irrationally, Dr. Slovic goes well beyond the inferential power of the
3 isolated and off-point telephone survey data he points to, and he relies on wholly inapplicable
4 experimental data.

5 Q: How about Dr. Weinstein, are his opinions and methods widely accepted?

6 A: No. Dr. Weinstein's view that smokers suffer from an "information deficit" is
7 inconsistent with the robust and nearly universal awareness that people have about the signal
8 risks of smoking. His theory is also inconsistent with the scientific evidence from intervention
9 studies. Repeated experimental interventions have tested the hypothesis of an information
10 deficit, but have failed to demonstrate a change in smoker behavior by providing additional
11 information about the health risks.

12 VI. OPTIMISM BIAS DOES NOT EXIST FOR SMOKING OR ABILITY TO QUIT

13 A. Empirical Evidence Does Not Show Optimism Bias for Smoking-Related
14 Disease

15 Q: Are you aware that Dr. Weinstein testified that "[o]ne major methodologic flaw" in
16 your analyses and survey data on people's perceptions of the risks of smoking is that your
17 "surveys do not take optimism bias into account" and that optimism bias does "operate for
18 smokers."

19 A: Yes, at page 43 of his written direct testimony.

20 Q: And are you also aware that Dr. Slovic testified that your "arguments are lacking,"
21 in part because you "neglect[] to take into account or test for the effects of optimism bias?"

22 A: Yes, that testimony was part of his written direct exam. Slovic Written Direct at 47.

23 Q: How do you respond to these criticisms?

1 A: First, I have not neglected this theory. I discuss the optimism bias hypothesis in my
2 book, SMOKE-FILLED ROOMS: A POSTMORTEM OF THE TOBACCO DEAL. JD-004645. There I
3 report on original experimental evidence that I generated to test this theory in my work for EPA.
4 Second, claiming that I have ignored optimism bias is an odd argument for each of them to
5 make; for Dr. Slovic this criticism is odd because his heuristic principle is that people don't
6 actually think about smoking decisions, thus it is unclear why he would be concerned about the
7 impact of a potential bias in cognitive operations. And it is an odd argument for both Dr. Slovic
8 and Dr. Weinstein to make because in nearly every activity they have investigated, *except*
9 *smoking*, they claim to have found the bias present. So, in accordance with their theory it would
10 be a human trait, not a defect in an information environment. Additionally, their own research
11 does not confirm that people tend to believe their smoking risks are smaller than other similarly
12 situated smokers. And finally, even if we were to assume that people did express optimism
13 about smoking risks, neither Dr. Weinstein nor Dr. Slovic has come forward with any data
14 indicating that people are over-optimistic in their risk taking *behavior*. My empirical results
15 indicate that the so called optimism bias is simply the result of question framing and has no
16 practical consequences for risk taking behavior.

17 Q: Why do you say the optimism bias phenomenon reported by Dr. Weinstein and Dr.
18 Slovic is a consequence of a framing effect in the survey question?

19 A: The typical optimism bias survey question asks people whether they are above average,
20 below average, or average, in terms of risk or safety. Such comparative risk questions, in effect,
21 ask respondents to find fault with themselves by rating themselves as worse, in some respect,
22 than their peers. Faced with such questions, few people will fault themselves and admit that they
23 riskier or less safe than others. As a consequence, almost all respondents will say that they

1 consider themselves to be average or better than average.

2 Q: Is there data to support your conclusion that optimism bias is a result of question
3 framing and human nature?

4 A: I think the fact that Dr. Weinstein and Dr. Slovic have found optimism bias for virtually
5 every risk tested, except smoking, supports my point.

6 Q: Let's look at some of their research which you say found widespread optimism in
7 areas apart from smoking. What types of risks or activities are you talking about?

8 A: Well, just as an example, in his article *Unrealistic Optimism about Susceptibility to*
9 *Health Problems: Conclusions from a Community-Wide Sample*, US Ex. 73307, Dr. Weinstein
10 reported that he had found a statistically significant optimism bias for all of the following risks:
11 developing an alcohol problem, attempting suicide, developing asthma, getting food poisoning,
12 getting poison ivy, having sunstroke, having a nervous breakdown, being a homicide victim,
13 getting gallstones, going deaf, getting pneumonia, developing lung cancer, having cold sores,
14 going senile, getting laryngitis, developing gum disease, having tooth decay, having insomnia,
15 developing an ulcer, being a mugging victim, contracting diabetes, contracting the flu, and
16 suffering a serious automobile injury. Similarly, in an article he published in 1993, entitled, *A*
17 *Psychometric Study of Adolescent Risk Perception*, JD-000618, Dr. Slovic found optimism bias
18 for every risk he tested, *except* for cigarette smoking. He found that adolescents exhibited
19 optimism bias toward drinking five or more alcoholic beverages, smoking marijuana, the risk of
20 sexuality activities across disease and pregnancy categories. For each of the categories, other
21 than smoking, he found that adolescents perceive their personal risk to be below that of their
22 peers.

23 Q: How do Dr. Weinstein and Dr. Slovic define optimism bias?

1 A: On page 43 of his written direct Dr. Weinstein states: ““Optimism bias’ refers to the
2 strong tendency of people to believe that their own risk is less than the risk of their peers. In
3 other words, whatever people may accept about the risks faced by the ‘average smoker’ or by
4 ‘smokers in general,’ they tend to believe that they have a lower risk.” Dr. Slovic calls it “a
5 psychological phenomenon whereby people consistently assert that their personal risk from some
6 activity or hazard is less than the risk faced by others.” Slovic Written Direct at 28 (emphasis in
7 original).

8 Q: Are those appropriate ways to characterize a decision making “bias”?

9 A: No. For starters, Drs. Slovic and Weinstein are asking the wrong question. Whether
10 people believe the risk they face is above or below the risk that others are facing is not the key
11 issue. What matters is whether people’s perceived risks of smoking are in line with the objective
12 scientific levels of the risk. People could, for example, believe that they face lower risk than do
13 others and still have an exaggerated perception of the risk. Also, people could legitimately
14 believe that their own risk is less than the risk faced by their peers. For example, smokers who
15 smoke only occasionally might accurately describe their own smoking risk as less than that faced
16 by the average smoker. I would not characterize the expression of such a belief as optimistic or
17 inaccurate.

18 Q: You said your book SMOKE-FILLED ROOMS reported on original experimental
19 evidence that you generated to test this “optimism bias” theory; what specifically were you
20 trying to determine?

21 A: Well, the key issue for me, with respect to the reported “optimism bias,” is not whether it
22 is possible to construct survey questions that generate “optimistic” responses. Rather, the
23 important question is whether such responses are actually predictive of risk-taking behavior. The

1 behavioral link is the critical step that Dr. Weinstein and Dr. Slovic ignore. My EPA research,
2 which is discussed in my book, was designed to test whether people who give survey responses
3 that would be considered “optimistic” actually engage in excessive risk taking behavior.

4 Q: And what did you find?

5 A: I found that for the same product risks for which people expressed optimism bias, there
6 was considerable unwillingness to actually incur the product risks through actual behavior. In
7 fact, though they expressed optimism, people were willing to pay quite substantial amounts for
8 safer products where the safety dimension being improved was the same one that was targeted in
9 the optimism bias questions. The only empirical evidence that we have concerning any
10 behavioral consequences of optimism bias shows that people do not behave in an optimistic
11 manner when taking risks, irrespective of how they answer optimism bias questions. The so-
12 called optimism bias results are simply an artifact of question framing and do not have any
13 behavioral significance.

14 Q: Are you generally familiar with Dr. Weinstein’s research on optimism bias?

15 A: Yes, at least a substantial amount of it.

16 Q: Has Dr. Weinstein ever reported data on the issue of whether smokers report
17 unrealistic optimism about their chances of developing smoking related disease?

18 A: Yes; he has. For example, he asked questions related to his concept of optimism in the
19 Annenberg-II survey. JD-022826.

20 Q: And what did his study show?

21 A: The results failed to show any optimism bias for smokers. In fact, the results often show
22 that smokers perceive smoking as being more hazardous to themselves than it is to other
23 smokers.

1 Q: Can you point the Court to the particular questions in Annenberg-II that produced
2 those results?

3 A: Sure. Question 20 asked smokers directly about the very comparison Dr. Weinstein
4 asserts is relevant to assessing optimism bias. It asked: "Compared to the average smoker, do
5 you think you are more likely to get sick from smoking, less likely to get sick from smoking, or
6 that your chance of getting sick from smoking is about the same as the average smoker?" JD-
7 022826.

8 Q: And what was the result?

9 A: The result showed no evidence of optimism bias as he has defined it. The majority of
10 both adult and teen smokers said their risk was about the same as the average smoker, and the
11 remaining smokers split pretty evenly between "more likely" and "less likely" to get sick than
12 the average smoker. JD-025085.

13 Q: Some smokers said they were less likely to get sick than the average smoker?

14 A: Yes.

15 Q: Why isn't that evidence of optimism bias among smokers?

16 A: Because some smokers are, in fact, less likely to develop a smoking-related disease than
17 other smokers. If you cross tabulate the responses to Question 20 in Annenberg-II according to
18 the amount that the people providing the response reported that they smoked, most respondents
19 who said they were less likely to get sick than the average smoker, actually smoke less than the
20 average smoker. Thus, it was not "optimistic" for such smokers to have answered as they did.

21 JD-025171.

22 Q: Are there other data from the Annenberg-I and Annenberg-II studies that show that
23 smokers rate their personal risk of smoking as being comparable to other people's risks?

1 A: Yes. In Annenberg-I, Question 4 asked respondents to rate the riskiness of smoking *to a*
2 *person's health*, and 88% of smokers said it was somewhat or very risky. JD-020489. Later in
3 the same study, Question 20, these smokers were asked "Do you think smoking is very risky *for*
4 *your personal health*, somewhat risky, not too risky or not at all risky?" In response to that
5 question, 94% of smokers said smoking was somewhat or very risky for their personal health.
6 JD-020489.

7 Q: So, is it fair to say that smokers in Annenberg-I rated smoking at least as risky and
8 perhaps even riskier for their own personal health than for other smokers?

9 A: Yes; that's correct. The results show a lack of optimism bias among smokers with
10 respect to smoking-related disease.

11 Q: Has Dr. Slovic ever surveyed smokers about potential optimism bias for smoking-
12 related diseases?

13 A: Yes. For example, Dr. Slovic looked for evidence of optimism bias in the 1993 article I
14 mentioned earlier, *A Psychometric Study of Adolescent Risk Perception*, JD-000618.

15 Q: What did he find with respect to smoking risks?

16 A: Adolescents rated their own personal risk from smoking higher than they rated smoking
17 risks for their peers.

18 B. Evidence Does Not Show Optimism Bias for Ability to Quit Smoking

19 Q: You testified earlier about some problems in evaluating people's intentions about
20 quitting smoking. Even if people aren't asked to "guess" about their future conduct, are
21 questions about people's intentions to quit smoking meaningful?

22 A: Usually not, because in framing a question about "intent," we typically don't know what
23 the responses are picking up. For instance, there is a well-known bias towards providing a

1 response that is “socially acceptable.” So, in responding to a question about their “intent” to quit
2 smoking, many people may say that they intend to quit as a form of learned response that they
3 have developed in response to criticism of their smoking behavior. We also don't know exactly
4 what people are conveying when they say they intend to quit smoking or plan to quit smoking.
5 How definite might their “intent” or their “plan” be? The problems with such questions have
6 been well known in the survey literature for decades. Dr. Slovic acknowledged that people's
7 survey responses about their intent to engage in socially acceptable behaviors does not
8 correspond with their actual behavior, but I disagree with what he claims is “exactly the point” of
9 what survey experts have observed. 2/18/05 Tr. Tran. at 10304-06. Dr. George Gallup himself
10 observed for the types of questions being discussed in Dr. Slovic's testimony that : “To the
11 typical American the word 'intend' or 'plan' connotes many things ranging from 'Do I think this
12 is a good idea?', 'Would I like to do it?', 'Would it be good for me?', 'Would it be good for
13 other people?', etc. These and similar questions of a prestige nature reveal attitudes, but they are
14 a poor guide to action.” G. Gallup, THE SOPHISTICATED POLL WATCHER'S GUIDE, JD-025099 at
15 88. Several studies which have followed up responses to questions about quitting indicate a
16 remarkable disparity between a statement reflecting an intention to quit and even preliminary
17 subsequent actions. For instance, in my second book on smoking, I discuss the results of the
18 Koslowski (1980) study. JD-025184. In that study, people who had expressed an interest in
19 quitting were followed to see what action they took. Only 5% took even the first step of
20 attending a preliminary meeting about quitting, and only 3% actually made use of cessation
21 services that were offered. JD-025184.
22 Q: Relying on such survey questions about intent to quit, both Dr. Weinstein and Dr.
23 Slovic testified that smokers also exhibit optimism with respect to their ability to quit

1 smoking. Do the data show that smokers are unrealistically optimistic about their ability to
2 quit smoking?

3 A: No. The data Dr. Weinstein and Dr. Slovic rely on do not support their conclusion that
4 smokers are overly optimistic about their ability to quit smoking.

5 Q: What data are you referring to, specifically?

6 A: The Monitoring the Future data discussed by both Dr. Weinstein and Dr. Slovic in their
7 written direct testimony. The data are shown in US Ex. 17378.

8 Q: What testimony did Dr. Slovic give with respect to that data?

9 A: On page 26 of his written direct, he testified: “For example, a longitudinal survey
10 conducted as part of the University of Michigan’s Monitoring the Future Study found that 85%
11 of high school seniors who smoked occasionally predicted that they probably or definitely would
12 not be smoking in five years. However, in a follow-up study five to six years later, of those who
13 had smoked one to five cigarettes per day as high school seniors, only 30% had quit, and 44%
14 had actually increased their cigarette consumption.”

15 Q: Is there a flaw in Dr. Slovic’s interpretation of the data?

16 A: Yes. The most obvious problem is that he is comparing apples and oranges. That is, Dr.
17 Slovic compares the quitting predictions of one subset of people (“high school seniors who
18 smoked occasionally”) with the actual quitting rates of an entirely different population (“those
19 who had smoked one to five cigarettes per day as high school seniors”). Such a comparison
20 simply cannot show optimism bias. In order to show optimism bias among those “who smoked
21 occasionally,” one would have to compare *their* quitting predictions to *their* quitting rates five
22 years later – not their quitting predictions to the quitting rates of some other group, as Dr. Slovic
23 did.

1 Q: Are there other problems with Dr. Slovic's presentation of the data?

2 A: Yes. In order to get his quitting predictions percentage, Dr. Slovic takes the percentage
3 of those who said they definitely would not be smoking in five years and adds to it all of the
4 people who said they "probably" would not be smoking in five years.

5 Q: What is wrong with that?

6 A: Only those who say they definitely will not be smoking in five years have actually
7 predicted that they *will* quit. Those who said they "probably" would not be smoking in five
8 years have acknowledged uncertainty about what they would do.

9 Q: What happens to the results for the group Dr. Slovic calls "occasional" smokers if
10 you correct these errors?

11 A: Well, looking only at the data from this group -- classified in the study as those who
12 smoke less than one cigarette per day -- and comparing the percentage of smokers in this group
13 who said they would definitely not be smoking in five years to the percentage of smokers in this
14 group who actually had quit in five years, you find that more than twice as many quit as said they
15 would. To be specific, 28% said they definitely would not be smoking in five years, and in the
16 follow-up study, 57.8% of these smokers actually had quit. US Ex. 17378. So, the data do not
17 show optimism bias about quitting for this group of smokers. To the contrary, the data show that
18 these smokers underestimated the likelihood that they would quit smoking in the future.

19 Q: We have been talking about the Monitoring the Future Survey data on smokers who
20 smoked less than one cigarette per day. Does the survey provide data on smokers who
21 smoked more than that?

22 A: Yes. It also includes data on smokers falling into the following categories: (1) those who
23 smoked 1-5 cigarettes per day; (2) those who smoked about a $\frac{1}{2}$ pack per day; and (3) those

1 show smoked a pack or more per day. US Ex. 17378.

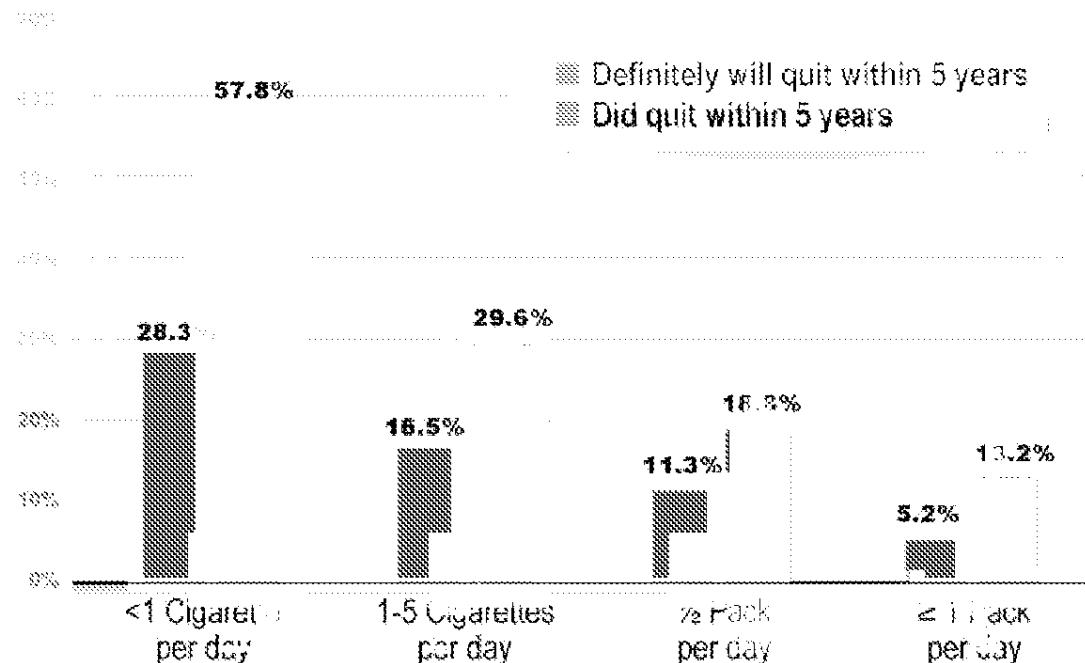
2 Q: Within these other categories of smokers, would you compare the percentage that
3 said they would definitely not be smoking in five years to the percentage that actually had
4 quit five years later?

5 A: Sure. Of the group that smoked 1-5 cigarettes per day, 16.5% said they definitely would
6 not be smoking in five years and, five to six years later, 29.6% of the smokers in that group had
7 quit. US Ex. 17378. Of the group that smoked about $\frac{1}{2}$ pack per day, 11.3% said they definitely
8 would not be smoking in five years and, five to six years later, 18.8% of the smokers in that
9 group had quit. US Ex. 17378. Finally, of the group that smoked a pack or more per day, 5.2%
10 said they definitely would not be smoking in five years and, five to six years later, 13.2% of the
11 smokers in that group had quit. US Ex. 17378. So, for each group, about twice as many people
12 had quit smoking five years later as said they definitely would.

13 Q: Does demonstrative JDEM-020060, which is reproduced below, accurately reflect
14 the data you just provided?

15 A: Yes it does.

HIGH-SCHOOL SENIORS' SMOKING PREDICTIONS AND SITUATIONS



1 Source: Growing Up Tobacco Free: Preventing Nicotine Addiction in Children and Youths, Monitoring the Future, 1994; US 84-17378 JDEM-020060

2 Q: In your opinion does the Monitoring the Future data demonstrate that smokers
 3 exhibit optimism bias with respect to their ability to quit smoking in the future, as Dr.
 4 Weinstein and Dr. Slovic suggest?

5 A: No. In fact, it shows the opposite.

6 Q: Have you studied data on the perception that youth have about the difficulty of
 7 quitting smoking?

8 A: Yes, I have.

9 Q: What do those data show?

10 A: That people, adults and adolescents, smokers and non-smokers alike, believe that once
 11 you have started smoking, quitting will not be easy, and that the difficulty of quitting will

1 increase with the duration of smoking. As I explained in my second book about smoking, nearly
2 every smoker labels smoking a habit, an addiction, or both. Only 4% of smokers in a 1998 study
3 expressed a belief that it was neither. And Dr. Weinstein and Slovic's own data show that
4 people, including adolescents, believe it is difficult to quit smoking once you start, and that
5 difficulty increases the longer you smoke. Dr. Weinstein agreed, quite correctly, that teens
6 overwhelmingly responded to the Weinstein, Slovic (2001) survey that they "understood the
7 longer you smoke, the harder it is to quit." 2/14/05 Tr. Tran at 13206. In fact, 96% of smokers
8 agreed with that statement, and, rather than expressing unrealistic optimism, Dr. Weinstein
9 believed the respondents in that survey "all seem[ed] to take that personally." *Id.*; JD-025084,
10 WS, Q7C (pp. 45-46). When respondents in the 15-19 age group were asked how long it would
11 take a ½ pack per day teenage smoker to shows signs of addiction, over half said it would only
12 be days or weeks, and only 3% said over 1 year. JD-025084, Q17. Not a single respondent
13 reported a belief that it would not occur. *Id.* Similarly, using the same metric for amount of
14 smoking, only 1% of 15-19 year olds stated their belief that it would be "easy" for a person who
15 had smoked for several years to quit. JD-025084, WS, Q19. Of the remaining 99%, 23%
16 believed quitting would be "almost impossible," 41% believed quitting would be "very hard, and
17 most cannot do it," with the remaining 33% expressing the belief that quitting would be "hard,
18 but most people can do it if they really try." Compared to historical quitting data, these results
19 do not suggest that people underestimate the difficulty of quitting, but instead anticipate that it
20 will probably be difficult, and that the difficulty will increase with increased smoking.

21 VII. SOURCE CREDIBILITY

22 Q: Have you studied the factors that are influential in risk decisions and how people
23 respond when they receive divergent information from different sources about a particular

1 risk?

2 A: Yes, and I have published several articles in that area. My research has addressed a wide
3 range of questions directly related to those issues, including: the effect of risk level implied by
4 new information on the updating of risk beliefs, the weight people place on new information that
5 they have received, how people process imprecise risk information, how individuals process
6 diverse or conflicting risk information, how people utilize particular sources of risk information,
7 such as the risk information they receive from the government versus the entity generating the
8 risk, how people react when the mix of information reflects different levels of risk, and whether
9 the way in which people weight this information reflects rational processes. For instance, in
10 1997, I published a peer-reviewed article dealing with that topic entitled, *Alarmist Decisions*
11 *With Divergent Risk Information*, in THE ECONOMIC JOURNAL. JD-023084. That article was
12 named Best Article of the Year by the Royal Economic Society and remains undisputed in the
13 scholarly literature.

14 Q: What is an “alarmist” decision?

15 A: I label a decision as being alarmist if there is an asymmetry in how people weight risk
16 information by focusing only on the worst case risk estimates. In the presence of diverse risk
17 information received from different entities, people overweight the value of high risk judgments.
18 In other words, they devote excessive attention to the worst case. Interestingly, I have
19 demonstrated this result to be independent of the perceived credibility of the source of the
20 information. The pivotal ingredient is that there must be a disagreement about the risk from two
21 different sources of risk estimates.

22 Q: Does that mean the credibility of the source of the information doesn’t matter, it is
23 only who provides the information tending to show a higher risk?

1 A: No, the results concerning the higher risk when estimates are divergent do not imply that
2 source credibility is unimportant. In fact, it is. My earlier research established that the
3 information weight associated with new information, which will depend quite critically on the
4 credibility of the source, will be a major determinant of how people update their risk beliefs in
5 light of the new information. Thus, people will place substantially more weight on risk
6 information that they receive from the government than from the entity or industry that may be
7 associated with the risk.

8 Q: Could you briefly describe the research methods you have used?

9 A: In THE ECONOMIC JOURNAL article I just mentioned, we developed an experimental
10 structure to provide guidance for EPA as to how people would respond to scientific risk debates.
11 Using a sample of adults, we asked them to make decisions about where to live based on
12 information about air pollution risks. Individuals were given risk information from different
13 government and industry sources, as well different sets of information comprising higher and
14 lower estimations of risk. We provided different combinations of divergent risk information to
15 different study subjects. The study subjects were then asked to express their preferences
16 between different areas posing different risks, according to the information that they had
17 received. This procedure established the precisely understood risk level that would be equivalent
18 to the divergent pair of risks that were presented to the respondents in the experiment.

19 Q: What did your research find?

20 A: When faced with competing risk estimates from government and industry sources,
21 respondents tended to adopt the higher risk estimate regardless of which source provided that
22 estimate. So where government said the risk is high and industry said the risk is low, people
23 tended to accept the government's risk estimate as the correct one. Conversely, when industry

1 provided the higher risk estimate, people tended to accept industry's assessment of the risk. In a
2 nutshell, respondents gravitated to the value of the high risk judgment, regardless of who
3 provided it.

4 Q: What is the practical significance of that research?

5 A: People learn from risk information, but in the process they devote excessive attention to
6 worst case scenarios, particularly when different parties disagree about the level of the risk. It is
7 not simply the case that individuals happen to believe that the information source that provided
8 the high risk information in a particular risk context is more credible. People dominantly weight
9 the credibility of the source and the information, based on whether the source is providing the
10 high risk or low risk information, compared to the other party providing the divergent
11 information.

12 Q: Have you also researched how the public weighs the credibility of particular sources
13 of information about smoking and health?

14 A: Yes. I reviewed public opinion poll data, collected by the Gallup and Roper polling
15 organizations, on the credibility of various sources of information.

16 Q: In general, what do those data show?

17 A: These survey data suggest that the experience in smoking and health is quite consistent
18 with the research mentioned above. People believe and place a much greater weight on the
19 information they have received from the government and public health groups, and they assign
20 very low credibility or weight to information they have received from the tobacco industry. In
21 other words, source credibility matters.

22 Q: How did those polls measure source credibility?

23 A: They used several different questions. Some asked how favorably or unfavorably people

1 felt toward different sources, such as the government or the tobacco industry. Others asked
2 people to rate the honesty and ethical standards of the various groups. Still others asked people
3 whom they would trust most for different types of information.

4 Q: What is the most meaningful way to evaluate these poll data on source credibility?

5 A: Ideally, we would like a controlled experiment in which we could evaluate the effect of
6 each source on risk beliefs. Absent that, the next best approach is to determine how people
7 themselves rate the credibility of the source. If there is a difference in the information being
8 disseminated, we will be concerned with the relative information weight for each source in
9 comparison with other information sources. In other words, when relying on individual
10 assessments of credibility, the context and the other information sources at work in that context
11 are critical to evaluate whether a particular source is high or low.

12 Q: Have polls also been conducted on the credibility of associations and trade groups?

13 A: Yes. For instance, in 1989, the Gallup Poll asked people how favorably they felt toward
14 nine professional associations. Gallup asked, "I'd like your overall opinion of some trade and
15 professional associations and special interest groups. Is your overall opinion of [the particular
16 group] very favorable, mostly favorable, mostly unfavorable, or very unfavorable?" JD-022803.

17 Q: Which associations or groups did people rate most favorably?

18 A: The American Cancer Society was rated most favorably, with 93% of people feeling
19 either "very" or "mostly" favorable toward it. JD-022803. The next most favorably rated group
20 was the League of Women Voters, about whom 85% of respondents felt "very" or "mostly"
21 favorable. *Id.*

22 Q: Which association was rated least favorably?

23 A: People were most unfavorable, by far, toward the Tobacco Institute. *Id.* Only 26% held

1 favorable feelings toward it. *Id.* The group that was second to last, the American Civil Liberties
2 Union, received a 54% favorable rating. *Id.*

3 Q: What does this poll suggest about the believability of sources of smoking and health
4 information?

5 A: The poll shows that the American Cancer Society is a much more credible source than is
6 the Tobacco Institute. As a result, if both groups released statements about smoking and health,
7 it is much more likely that the public would believe the American Cancer Society than the
8 Tobacco Institute.

9 Q: Have public opinion polls asked people their opinions of different companies?

10 A: Yes. In June 1980, the Roper Poll asked people how favorably they felt toward several
11 companies. JD-022947. Roper asked, "Now let me ask you about a few specific businesses.
12 [Specific business]—is your opinion of them highly favorable, or moderately favorable, or not
13 too favorable, or rather unfavorable?"

14 Q: What were some of the companies about which the Roper Poll asked?

15 A: Roper asked about the following corporations: Philip Morris Incorporated, J.C. Penney
16 Co. Inc., Sears, Roebuck and Company, The Continental Group, Atlantic Richfield Company,
17 Mobil Oil Corporation, Thomas J. Lipton, Inc., Eli Lilly, Ford Motor Company, 3M Company,
18 The Upjohn Company, United States Steel Company, ALCOA, General Motors, DuPont, IBM,
19 ABC, CBS, and General Foods Corporation. JD-022947.

20 Q: How was Philip Morris rated compared to the other companies?

21 A: People felt least favorably toward Philip Morris of any of the companies about which
22 they asked. *Id.* Only 31% of the respondents felt "highly" or "moderately" favorable toward
23 Philip Morris. *Id.* In contrast, 83% of the respondents felt "highly" or "moderately" favorable

1 toward J. C. Penney, the most favorably rated company. *Id.*

2 Q: Did you review Dr. Weinstein's reliance material, the McMillen study that was
3 published in 2002?

4 A: Yes, I did, as well as Dr. Weinstein's testimony about the source credibility findings in
5 McMillen.

6 Q: Does the McMillen study report findings that are relevant to the source credibility
7 of the tobacco industry?

8 A: Yes. And I agree with Dr. Weinstein that McMillen reflects people's acknowledgements
9 about the risks of smoking. However, I disagree with his assertion at page 13251 of the trial
10 transcript that McMillen does not provide evidence of source credibility. McMillen's results are
11 similar to the Gallup and Roper poll data, but McMillen is also illustrative because it contains a
12 combination of these data, and the questions were asked in quite specific ways. JD-025125. For
13 instance, in this national survey, McMillen asked people if they believed statements by tobacco
14 companies "that tobacco is not harmful to health." 98.4% said they did not, and McMillen
15 correctly categorized that response of disbelief as "universal." *Id.* at 60. McMillen also asked a
16 group of 18-24 year olds whether "Tobacco companies are being truthful when they say tobacco
17 is not harmful to health." Within this entire national survey, not a single 18-24 year old strongly
18 agreed with that statement. *Id.* at 63. In fact, in a series of questions on what were called
19 "tobacco companies' claims" that tracks many of the plaintiff's allegations in this case, using a
20 standard by which a belief in excess of 85% was considered "universal," *id.* at 32, McMillen
21 found essentially universal disbelief regarding those "claims": (a) that nicotine levels are not
22 manipulated in cigarettes (92.7% expressed disbelief); (b) that ads do not encourage kids to
23 smoke (84.4% expressed disbelief); (c) that second-hand smoke is not harmful to health (96.4%

1 expressed disbelief); (d) that nicotine is not addictive (96.4% expressed disbelief). *Id.* at 32, 60,
2 78.

3 Q: What is your conclusion concerning these polls with respect to the credibility of
4 sources of information on smoking and how it has influenced people's perception of the
5 risks?

6 A: There is an enormous disparity between the credibility of government and public health
7 and tobacco industry sources of risk information, one set of sources at the top, the other at the
8 bottom. Consistent with the body of research I have discussed above, people would assign
9 dominant weight to the risk information that they have received from the government and the
10 public health community, and they would assign little or no weight to the risk information they
11 may have received from tobacco industry sources. First, people tend to heavily weight and find
12 more credible high risk information, regardless of the source, when risk information is divergent.
13 Second, people overwhelmingly find tobacco industry sources incredible, and hold in them in
14 low esteem.

15 **VIII. ECONOMICS OF ADDICTION**

16 Q: Do economists study addiction?

17 A: Yes. There is a large body of literature on the economics of addiction.

18 Q: Why do economists study addiction in the context of a consumer good?

19 A: Economists have studied how consumers make choices involving a wide range of product
20 characteristics. An addictive aspect of a product is one such characteristic. Since addiction is an
21 important aspect of some products, this property has attracted the interest of many economists.

22 Q: How do economists study addiction?

23 A: Economists study addiction in the same empirical fashion that they study a variety of

1 consumer behaviors. In making choices about products or behaviors, people trade off higher
2 risks and costs in order to get things that they value. An addictive property of a product is an
3 undesirable product attribute, but it does not foreclose the possibility that a rational consumer
4 could choose to consume the addictive product.

5 Q: What is an appropriate starting point to make an empirical evaluation of whether
6 people make rational decisions about cigarettes?

7 A: I would begin with consumer response to the price of cigarettes. Popular notions of
8 addiction often hypothesize that addicted smokers are locked into their smoking behavior. If that
9 is in fact true, then they should not be able to decrease their cigarette consumption in response to
10 an increased cost of smoking. The usual economic measure of price responsiveness is what is
11 called demand elasticity, and specifically price elasticity of demand. That is defined as the
12 percentage change in the quantity demanded of the good with respect to a one percent change in
13 its price.

14 Q: Have cigarette prices varied in the United States?

15 A: Yes, there are differences across states at any given point in time, and there are also
16 differences across time. The temporal pattern has been that in general cigarette prices have
17 increased on an inflation adjusted basis. These price increases can be attributed in part to
18 increasing taxation on cigarettes. Various states, for example California, Massachusetts,
19 Michigan, and Arizona, have imposed additional taxes on cigarettes, specifically to discourage
20 smoking. Economic analyses show that historically, as taxes have increased, almost all of the
21 tax increase has been passed along to the consumer through an increase in the price of cigarettes.

22 Q: Have you reviewed economic studies that assess the impact of these price increases
23 on smoking behavior?

1 A: Yes. In my book first book, SMOKING: MAKING THE RISKY DECISION, JD-004648, I
2 present a comprehensive review of that literature, which I updated for my more recent book.
3 Q: What do these studies show?
4 A: The studies show that smokers are highly sensitive to price changes. For instance,
5 economist Theodore Keeler and co-authors reported that “a substantial body of research by
6 health economists . . . suggests that large taxes on cigarettes can have a potent effect in reducing
7 cigarette consumption.” Keeler et al., *Taxation, regulation, and addiction: A demand function
for cigarettes based on time-series evidence*, JOURNAL OF HEALTH ECONOMICS (1993), US Ex.
8 80362.

9
10 Q: How does a demand elasticity help inform whether consumers are deciding
11 rationally or irrationally in their purchase of an addicting substance?

12 A: The estimated demand elasticity indicates whether people are willing to trade the
13 acknowledged risks and monetary and non-monetary costs of smoking in ways that are similar or
14 different from the risk/cost tradeoffs that we see for other products and behaviors. If the tradeoff
15 is similar, such evidence will provide empirical support for the behavior being consistent with
16 rational economic decision making.

17 Q: What direction in demand elasticity would you expect, if consumers were
18 responding rationally to increases in costs?

19 A: I would expect demand elasticity to be a negative number. A negative number indicates
20 that as the price of a good increases, demand for the good decreases. For normal consumer
21 goods raising the price will make the good less attractive and lead consumers to buy less.

22 Q: What is the demand elasticity for cigarettes among adults?

23 A: For cigarettes, elasticity estimates cluster in the range of -0.4 to -0.7, which means that a

1 ten percent increase in the price of cigarettes would lead to a four to seven percent drop in the
2 quantity of cigarettes demanded.

3 Q: Are these estimates of demand elasticity based on empirical observations of
4 reactions to real price hikes?

5 A: Yes. That estimate is based on my review of dozens of studies of the elasticity of
6 cigarette demand.

7 Q: Do people with lower levels of income respond differently to cigarette price
8 increases than do people with higher incomes?

9 A: Yes. As you might expect, price increases have the greatest effect on low-income
10 smokers, and have a significantly reduced impact on the behavior of high-income smokers.
11 Similarly, individuals with fewer years of formal education are more price responsive than
12 individuals with more formal education.

13 Q: Have some studies reported that younger adults are more sensitive to cigarette
14 prices than older adults?

15 A: Frank Chaloupka has estimated significantly higher demand elasticities for cigarettes
16 among college students, as compared to adults as a whole. Chaloupka and Wechsler, *Price,*
17 *tobacco control policy, and smoking among young adults*, JOURNAL OF HEALTH ECONOMICS
18 (1997), JD-025180.

19 Q: Have other studies reached the conclusion that younger smokers are no more
20 responsive to prices than older smokers?

21 A: Yes. Other economists estimate that cigarette demand elasticity for teenagers is similar
22 to elasticity estimates for adults. Wasserman et al., *The Effects of Excise Taxes and Regulations*
23 *on Cigarette Smoking*, JOURNAL OF HEALTH ECONOMICS (1991), JE-064522. In his earlier work,

1 Dr. Chaloupka also found that young adults were actually less price responsive than adults.

2 Chaloupka, *Rational Addictive Behavior and Cigarette Smoking*, JOURNAL OF POLITICAL
3 ECONOMY (1991), JE-064577.

4 Q: Are younger adults or younger smokers more price sensitive than adults?

5 A: That is a difficult question to answer with firm empirical evidence, particularly for
6 smokers below the legal age of smoking. Their overall consumption is a very small fraction of
7 the overall market, and it has proven to be quite difficult to quantify precisely. Additionally,
8 many underage smokers don't buy their cigarettes, so consumption cannot be equated with
9 purchase behavior. And the rate at which they consume and purchase cigarettes is markedly
10 different than the rate for older age groups. Finally, there are survey data which suggest that
11 underage smokers exhibit brand preferences for higher priced cigarettes. The most that we can
12 say with confidence is that there is no evidence in the literature that young people are less price
13 responsive than adults, and the studies that indicate a difference suggest that youths may be more
14 price responsive.

15 Q: How do reactions to increased cigarette prices compare to reactions to higher prices
16 for other products?

17 A: People respond to price changes in cigarettes the same way they do to price changes in
18 many other products: they stop using them altogether or reduce their consumption. Demand
19 elasticity for cigarettes is comparable to the elasticity of theater and opera tickets, jewelry and
20 watches, barbershops and beauty parlors, stationery, toiletries, electricity, water, newspapers and
21 magazines, and legal services.

22 Q: Is this true in the long-run as well as in the short-term?

23 A: Yes. The long-run price responsiveness of cigarette demand is even greater than in the

1 short-term and is also comparable to that of many common consumer products.

2 Q: If smokers had no choice in whether to smoke, would you expect their consumption
3 to be that price sensitive?

4 A: No. If smokers had to smoke, the demand for cigarettes would not be price sensitive.

5 Smokers would continue to want the same amount of cigarettes even as the costs went up
6 because they were “hooked.” Instead, as many researchers have shown, people’s decisions about
7 smoking reflect a rather typical cost/value tradeoff; they give up cigarettes in expected
8 proportion to the increase in costs.

9 Q: As an economist, are smokers’ responses to price increases evidence of rational
10 decision making concerning smoking behavior?

11 A: Yes. This is a rational response, demonstrating that the desire to smoke, though
12 powerful, does not negate the rational control of smoking behavior.

13 Q: Have you also reviewed literature on smokers’ responses to restrictions on public
14 smoking?

15 A: Yes.

16 Q: Have you studied and published on the effect of workplace restrictions?

17 A: Yes. My publications discuss the economic studies of workplace smoking restrictions
18 enacted in medical facilities, large corporations, public service agencies, and workplaces in
19 general on a state-wide level.

20 Q: How do empirical studies measure the effect of public smoking restrictions?

21 A: Economists have relied on several methods to analyze the issue. Because public smoking
22 restrictions are usually adopted and announced well in advance of taking effect, researchers often
23 can compare smoking behavior in a given workplace prior to smoking regulations with smoking

1 behavior in the months or years following the regulation. Another approach is to compare
2 smoking behavior in a workplace that adopted a smoking restriction with a similarly sized and
3 situated workplace that did not restrict smoking in the workplace. Yet another approach is to
4 compare survey responses of individuals who work in workplaces with smoking restrictions to
5 the survey responses of people working in unrestricted workplaces.

6 Q: In general, how do smokers respond to restrictions on public smoking?

7 A: When workplaces and public spaces prohibit smoking, it becomes more difficult for
8 smokers to smoke. In other words, the “opportunity cost” of smoking increases. In such
9 circumstances, consistent with a pattern of rational decision making, we observe the expected
10 result: that smokers either quit or substantially cut back on their smoking. For instance, Dr.
11 Wasserman, the economist I mentioned earlier, concluded that “anti-smoking regulations appear
12 to have a strong negative and statistically significant effect ($p < 0.05$) on consumption.”

13 Wasserman et al., *Effect of Excise Taxes and Regulations on Cigarette Smoking*, JOURNAL OF
14 HEALTH ECONOMICS (1991) at 58, JE-064522.

15 Q: Are there quantitative estimates of the amount that smokers reduce their smoking
16 behavior or stop smoking in response to workplace smoking restrictions?

17 A: Yes. Studies using national samples show that smoking bans, on average, reduce the
18 prevalence of cigarette smoking 4.8 to 5.7 percentage points. SMOKE-FILLED ROOMS, JD-
19 004645. For example, in the year after the Ochsner Medical Institutions in New Orleans,
20 Louisiana, banned smoking in its facilities, smoking prevalence among Ochsner employees
21 declined 30%, from 22% to 14%. Hudzinski and Frohlich, *One-Year Longitudinal Study of a*
22 *No-Smoking Policy in a Medical Institution*, CHEST (May 1990) at 1198, JD-023134. Johns
23 Hopkins Hospitals had a similar experience. One year after its ban on smoking in Johns Hopkins

1 Hospital facilities, smoking prevalence among Hopkins workers declined 25%. Stillman et al,
2 *Ending smoking at Johns Hopkins Medical Institutions*, JOURNAL OF THE AMERICAN MEDICAL
3 ASSOCIATION (September 26, 1990) at 1565, JD-023123.

4 Q: How does smoking prevalence in restricted workplaces compare with prevalence in
5 unrestricted workplaces?

6 A: The evidence suggests that smoking prevalence is significantly lower in workplaces that
7 restrict smoking. According to data from the 1990 California Tobacco Survey, prevalence in
8 restricted workplaces was one-third less than in workplaces without restrictions. While 21% of
9 workers in unrestricted workplaces were smokers, only 14% of the workers in restricted
10 workplaces smoked. Woodruff et al, *Lower levels of cigarette consumption found in smoke-free*
11 *work places in California*, ARCHIVES OF INTERNAL MEDICINE (June 28, 1993) at 1485, JD-
12 023142.

13 Q: Have researchers found increased cessation rates in workplaces with smoking bans
14 or restrictions?

15 A: The evidence is somewhat mixed. Some scholars have found no statistically significant
16 impact on cessation rates from public smoking restrictions, others have noted higher cessation
17 rates in restricted workplaces. For example, researchers in California observed more cessation in
18 restricted than unrestricted workplaces, based on survey data from the early 1990s. Woodruff et
19 al., *Lower levels of cigarette consumption found in smoke-free work places in California*,
20 ARCHIVES OF INTERNAL MEDICINE (June 28, 1993), JD-023142. Six years after smoking
21 restrictions were enacted at Boston's New England Deaconess Hospital, 26% of the workers
22 who were current smokers at the time of restriction had since quit smoking. Witt and Pass,
23 *Forecasting cigarette consumption: A causal model approach*, INTERNATIONAL JOURNAL OF

1 SOCIAL ECONOMICS (1983), JD-025178.

2 Q: Is there empirical evidence that public smoking regulations also lead to reductions
3 in the number of cigarettes smoked each day?

4 A: Yes, the evidence is consistent that smokers who cannot smoke at work consumer fewer
5 cigarettes each day. My estimate is that following a public or workplace smoking ban, smokers
6 consume on average two to two-and-one-half fewer cigarettes each day. SMOKE-FILLED ROOMS,
7 JD-004645. Other estimates have been somewhat higher. For example, following workplace
8 smoking restrictions at a large insurance company in Connecticut, smoking employees consumed
9 32% fewer cigarettes each day in the year after the policy was adopted than they did in the
10 months before the policy. Petersen et al., *Employee smoking behavior changes and attitudes*
11 *following a restrictive policy on worksite smoking in a large company*, PUBLIC HEALTH REPORTS
12 (March 1998) at 115, JD-023136.

13 Q: Do workplace smoking regulations affect the number of smokers who choose to
14 reduce their cigarette consumption?

15 A: Yes. More smokers in restricted workplaces reduce their consumption than those who
16 are still able to smoke at work. A majority of smoking hospital workers whose workplace
17 banned smoking reduced their daily cigarette consumption. Baile et al., *Impact of a Hospital*
18 *Smoking Ban: Changes in Tobacco Use and Employee Attitudes*, ADDICTIVE BEHAVIORS
19 (1991) at 419, JD-023127. Among insurance workers in a restricted workplace, significantly
20 more smokers reduced their daily cigarette consumption following the smoking regulations than
21 did so before. Compared to 13% who reduced their daily consumption prior to regulation, 44%
22 did so after the workplace regulation was imposed. Petersen et al., *Employee Smoking Behavior*
23 *Changes and Attitudes Following a Restrictive Policy on Worksite Smoking in a Large Company*,

1 PUBLIC HEALTH REPORTS (March 1998) at 115, JD-023136.

2 Q: Is there a difference between light and heavy smokers' reactions to workplace
3 smoking restrictions?

4 A: Yes. Studies in both the United States and Australia show that heavy smokers, often
5 considered the most highly addicted smokers, are actually the group most likely to reduce their
6 daily cigarette consumption in response to workplace smoking restrictions. Petersen et al.,
7 *Employee Smoking Behavior Changes and Attitudes Following a Restrictive Policy on Worksite*
8 *Smoking in a Large Company*, PUBLIC HEALTH REPORTS (March 1998) at 115, JD-023136.

9 Borland et al., *Effects of Workplace Smoking Bans on Cigarette Consumption*, AMERICAN
10 JOURNAL OF PUBLIC HEALTH (February 1990) at 178, JD-023122.

11 Q: Do most smokers report symptoms of withdrawal when they cut back the number of
12 cigarettes they smoke each day while at work?

13 A: Surprisingly, no. Fewer than half of the smokers in regulated workplaces indicated that
14 they exhibited any withdrawal symptoms from their reduced consumption. Baile et al., *Impact of*
15 *a Hospital Smoking Ban: Changes in Tobacco Use and Employee Attitudes*, ADDICTIVE
16 BEHAVIORS (1991) at 419, JD-023127.

17 Q: When smokers face the inconvenience cost of a workplace ban, do they compensate
18 for their reduced consumption at work by smoking more outside work?

19 A: Most studies indicate that even heavy smokers do not compensate before or after work
20 for lost consumption. While smokers may not exhibit a commensurate reduction in cigarette
21 consumption outside work, they also do not significantly increase their consumption outside
22 work. Biener et al., *A Comparative Evaluation of a Restrictive Smoking Policy in a General*
23 *Hospital*, AMERICAN JOURNAL OF PUBLIC HEALTH (February 1989) at 192, JD-023128.

1 Q: Have economists assessed whether these changes in smoking can be directly linked
2 to the policies?

3 A: Yes. Based on comparisons between indoor workers and self-employed and non-
4 workers, William Evans and co-authors concluded that their results are consistent with a causal
5 impact from workplace smoking restrictions. They wrote that “all of the unexplained drop in
6 smoking among workers can be explained by the rise in workplace smoking bans.” Evans et al.,
7 *Do Workplace Smoking Bans Reduce Smoking?*, AMERICAN ECONOMIC REVIEW (September
8 1999) at 745, JD-023125.

9 Q: Based on your review of the economic literature, do smokers respond to the
10 inconvenience costs of workplace and other public smoking restrictions by reducing their
11 smoking behavior?

12 A: Yes. It is clear from the literature that smokers reduce or sometimes even discontinue
13 their smoking because of these restrictions.

14 Q: As an economist, is this responsiveness to smoking restrictions and price changes
15 consistent or inconsistent with the ability to make a rational choice about smoking
16 behavior?

17 A: It is consistent with the ability to make a rational choice. If smokers were truly incapable
18 or “irrationally” resistant to quitting or cutting back, we would not observe these changes.
19 Instead, smoking prevalence would remain highly insensitive to smoking restrictions or higher
20 prices, and smokers would tend to smoke more outside work to compensate for any reduction in
21 consumption during the workday. However, reactions to smoking restrictions and price changes
22 demonstrate empirically that people are able to control their smoking behavior.

23 Q: Does that mean that it is easy to quit smoking?

1 A: Absolutely not. For many people, quitting smoking can be extremely difficult. The costs
2 of changing nearly any ingrained behavior can be high, and the evidence for cigarette smoking is
3 no different: the quitting costs are real and consequential. But the presence of those costs does
4 not mean that economic models are not informative, in fact they are quite informative. What the
5 empirical evidence shows is that quitting or reducing one's consumption is feasible, and that the
6 costs, though often high, do not distort normal patterns of rational behavior.

7 Q: As cigarette prices have risen over time and public smoking restrictions have
8 become more common, have smoking habits also changed?

9 A: Yes. There has been a dramatic increase in both cessation rates and the number of former
10 smokers. The ratio of former to current smoker rose from .32 in 1965 to .95 in 1998. SMOKE-
11 FILLED ROOMS, JD-004645.

12 Q: Thank you, Dr. Viscusi.